University of Alberta

Becoming the Universal Machine: Creating the Personal Computer in 1980s Literary and Popular Culture

by

Aimée Morrison

A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfillment of the requirements for the degree of Doctor of Philosophy

Department of English

Edmonton, Alberta
Spring 2004

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Your file Votre référence
ISBN: 0-612-96309-8
Our file Notre référence
ISBN: 0-612-96309-8

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Abstract

This project investigates the narrative history of the microcomputer, arguing that its cultural significance cannot fully be explained by a purely technical historiography.

"The Home Computer Revolution" situates the personal computer in the context of a historical condition of technoculture, tracing how the 'personal computer' becomes a privileged ideological object over the course of the 1980s, the figure via which a broader North American technoculture is broached in popular culture.

"Legacy Systems" examines the long narrative history of computer-like machines from the late nineteenth century forward. Close readings of key literary and filmic texts argue the case that fictional narratives better reflect the popular apprehension of computers and computerization than do more factual representations of advances in the state-of-the-art. The 'computer' here described is the imagined machine against which the 'personal computer' of the 1980s defines itself, both mining and repudiating this inherited imagery to establish itself as a new and distinct machine in popular culture.

"Machine of the Year" returns to the 1980s, addressing the decisive shift in both literary representation and popular reception of computing that occurs in the early 1980s, concentrating along three distinct axes: three chapters address narratives that seek to integrate new computing technologies into the known via a strategy of familiarization, a second group that promotes a new computer-inflected postmodern cynicism and technological survivalism, and a third mode of representation that adopts a much more fantastic and utopian take on the new technology, ultimately reflecting a nostalgia for a simple faith in machines. The apparent cacophony of representations disguises a basic

ideological coherence: an unchallenged assumption that the personal computer would forever, inevitably change culture.

"The Universal Machine" demonstrates how the positive recharacterization of computers and computing as both personal and empowering is conflated with the machine's success as a capitalist commodity, and leads, paradoxically, to the popularization of self-subjection to the increased reach of Foucauldian discipline in the name of a 'home computer revolution.'

Acknowledgements

Heather Zwicker deserves more thanks than I can find wit to bestow on her: as an advisor, a mentor, an editor, and a role model, she is unsurpassed. Harvey Quamen brought a sense of humour and an eye for detail to his careful readings of many early drafts. Thank you also to Michael O'Driscoll, Renée Elio, and Scott Bukatman.

Lesley Peterson and Eric Homich know far more about this dissertation than they ever needed to, but never said so: they are the best friends a writer and her hyperactive cat could have. Susan Hesemeier, Mark Morris, Lesley Peterson, Stephen Reimer, Stanley Ruecker, and Stéfan Sinclair donated period computers, software, manuals, and ephemera that have proved invaluable.

This dissertation is the culmination of research funded by a University of Alberta PhD Scholarship and a Dissertation Fellowship, as well as by the Social Sciences and Humanities Research Council of Canada.

Table of Contents

Introduction: The Home Computer Revolution 1

Part I **Legacy Systems** 36

Part II **Machine of the Year: The Computer Moves In** 85

1: "You've Just Run Out of Excuses for Not Owning a Personal Computer": *The Integrationist* Computer 109

2: "The Sky Was the Colour of Television, Tuned to a Dead Channel": *The Critical/Dystopian Computer* 166

3: "Why 1984 Won't Be Like '1984'": *The Fantastic/Utopian Computer* 208

Part III **The Universal Machine** 265

Works Cited 282

Curriculum Vitae 294

Introduction: The Home Computer Revolution

Introduction: The Home Computer Revolution

In January, 1983, *Time Magazine* named the "personal computer" as its 'Machine of the Year' in lieu of selecting a human agent as its more usual 'Man [sic] of the Year.' The article represents the attainment of a cultural high water mark: the moment of the emergence of the microcomputer as a taken-for-granted of North American society. It marks the moment, also, at which the microcomputer becomes the 'personal computer,' a machine distinct from the computing machines that had come before it, a machine heralding a 'revolution' in Western culture. Although the invention of the computer as an engineered technology can be variously dated, most conservatively at least thirty-five years before the editorial board of *Time* deigned to honour its latest incarnation, the 'personal computer' lauded by the magazine bears little narrative kinship to those earlier computing machines; indeed, its technological forebears aren't even mentioned in the article.[1] Instead, "Machine of the Year: The Computer Moves In" describes a fundamentally different material and imaginary machine, comprising a new set of personal, social, business, and educational practices based as much on futuristic speculation as on the capacities and uses of contemporary microprocessor technologies.

In 1983, the perceived impact of the microcomputer was profound, as witnessed in the 'Machine of the Year' award. *Time* claims to single out for its annual honour "the single person (man, woman, or even idea) who, for better or worse, has most influenced events in the preceding year" (Friedrich). The influence exerted by the new microcomputing machine in 1982 was notable not only for its intensity but for its range: the 'personal computer' described by *Time* had migrated from the discourses of science and science fiction into the mass popular imaginary. Over and above the practical technological advances it embodied, the machine of the year also asserted a vast cultural influence: it irrevocably changed the shape not only of the computing industry but also of the broader world of work by forcing a shift in focus to new kinds of computing, by new populations of users, on new kinds of machines, imagining themselves in new kinds of roles. At the same time, the microcomputer also made a distinct and lasting mark on popular culture: again, new roles were imagined for the smaller machine and its users on screen and on the page as much as in the home and in the office. Indeed, the 'computerization' of society was a discourse brought to the fore of public debate largely through the popular figuration of a new, 'personal', computer. After the arrival of this 'personal computer,' industry, finance, education, work, and home were all pervaded by its logic, and these institutions became different things from what they had been before it.

But what was it about the 'personal computer' that fomented this 'revolution,' such as these cultural shifts came to be characterized? What, that is, distinguished this new kind of computer from its numerous predecessors? What made it special? Computers, while not as ubiquitous in the early 1980s as they are today, were neither unknown nor new to North Americans.[2] Certainly, the war machines and corporate mainframes that were the recognizable antecedents of the microcomputer had been operating since the mid-1940s, and many computerized systems, such as those employed in making airline reservations and in calculating and mailing invoices from large utilities, were familiar to most North Americans. One significant difference is that of distance: these early machines, while familiar, were so only at a remove. These earlier computers were known by reputation alone, and on the basis of circumstantial evidence: while one's airline tickets were understood to be somehow 'computerized,' as demonstrated in the machine-readable block letters generated on a ticket, no consumer ever interacted with the behemoth which read and wrote these cryptic characters.[3] Nor were they expected to. Even within the corporations that made use of these large early commerical computing machines and systems, only a tiny subset of employees interacted with The Computer. These specialists became known as a 'priesthood' of experts, a nickname which indicates the level of mystification and awe which attended computing functions at mid-century.

Historically, these functions were also tightly regulated and highly specific: SABRE, for example, was a networked mainframe computer built to control airline reservations and ticketing.[4] It did nothing else, nor was it expected to, at least so far as the priesthood was concerned. Reverence of this orthodoxy, however, was not universal. From at least the late 1950s, non-priesthood computer enthusiasts—

university students, engineers, and select, well-connected hobbyists—had variously gained access to mainframe and minicomputing machines, and engaged with them for sustained periods of time, in pursuit of a myriad of useful and entertaining ends, in much the same way that a much broader population of non-expert users has learned to interact with the personal computer since the 1980s.[5] Before the advent of the 'personal computer' of the 1980s, though, this type of use was largely considered aberrant, futile, and wasteful of computing resources; this 'personal' use was characterized as time literally stolen from legitimate application by a minority population of techno-freaks, and not at all reflective of larger trends or broader (paying) consituencies.[6] Hacking, as this type of individual, interactive computing activity came to be know in the 1960s, is the exception that proved the rule: even when confronted with such use by enthusiasts, the various Powers That Be (in university administration, in the priesthood of industrial computing, and in research departments of computer manufacturers) were quick to reject the possibility of changing their practices or their machines.[7] In short, the computing machines that preceded the 'personal computer,' the mainframes and minicomputers that pervaded big corporations, government agencies, and research institutions since the 1950s, had never been considered as a technology of use to the individual—as useful as the 'atomic pastrami slicer' Gelernter describes in the epigraph.[8]

This mindset of one machine for one use, and of the tight control of access to the machines themselves by a technological priesthood who mediated their use, was so entrenched in the computing mainstream that, upon its appearance in 1976 and for several years afterward, the personal-use microcomputer was considered purely as a toy fit only for the *Popular Electronics* crowd: rabidly technophilic or games-obsessed individual hobbyists with science and engineering backgrounds. Far from being obvious candidates for 'Machine of the Year,' early microcomputers were lacking as much in reputation as they were in utility. For instance, the microcomputer was deemed truly irrelevant to the practices of business computing.[9] Not until the emergence of the IBM PC in 1981 was the 'personal computer' taken seriously as a computing tool in the mainstream of the industry and by the corporations and institutions it served. I would not want to overstate IBM's contributions to the wider domestication of what came to be known as personal computing technologies, but the corporate leviathan was a bellwether corporation which, if nothing else, inspired imitators to similarly commit themselves to the success of the little machines.[10] While the hobbyists who had cherished the microcomputer since its inception had, in the five-year interval between the MITS Altair of 1976 and the IBM PC of 1981, built a small but thriving industry around their little machines, they failed to crack open the mainstream in any large-scale way. These hobbyists-turned-entrepreneurs both dreaded and anticipated that kind of approval of their work, the stamp of legitimacy, that IBM's entry into the business would grant.[11] Hype about today's capricious and changeable Internet e-commerce bubble notwithstanding, in the late 1970s and early 1980s the computing industries did not turn on a dime, fall in love with new technologies, or cope well at all with change, generally. Thus, IBM's entry into the microcomputer market in August of 1981 was a really big deal.

I contend that a new imaginary and material technology, the 'personal computer,' was born into ideological coherence at roughly this moment. Beyond the seismic shift it both responded to and amplified in hardware manufacturing and corporate and personal computer purchasing, IBM's launch of its 'Personal Computer' is also contemporaneous with the moment at which 'the personal computer' as an *idea* extends beyond attempts to understand or employ the mere functionality of the machine, and into the realm of the popular cultural imaginary. [12] The advertising campaign that launched the IBM PC as a distinct product also helped to push the microcomputer beyond the discourses of industry and hobbyism and into the mainstream of North American culture more broadly.[13] Clearly aimed at a non-specialist audience and intended to popularize the idea of computing as appropriate to both the home and business environment, IBM's 'Little Tramp' spots aided and abetted the transformation of the *microcomputer*, a smaller and less-powerful offspring of larger-scale mainframe and mini-computers, into the *personal computer*, that wondrous machine that would balance our chequebooks, make our children smarter, revolutionize entertainment, and bring power to the people. This transformation took place as much on the silver screens of Hollywood as it did in the garages of Silicon Valley. This *cultural* birth of the personal computer was both well-attended and well-reported. In the early 1980s, the cultural preoccupation with the personal computer was pandemic: it was puzzled over and made-to-mean, test-driven in fiction, and investigated in journalism. It was, in short, *narrated* in nearly every available representational medium and genre. Hence the computer as 'Machine of the Year' for 1983. At the cusp of the decade, the 'personal computer' sprang suddenly and decisively onto the cultural stage, accompanied by prophecies of its unlimited potential and power. This new, imaginary, machine arrived trailing clouds of hyperbole: as represented in popular media, this 'personal computer' was everywhere and capable of everything.

And it *was* everywhere, at least in the cultural imaginary. Hollywood interested itself in the new machine, churning out a spate of films throughout the 1980s, among them *WarGames*, *Jumpin' Jack Flash*, *Superman III*, *Ferris Bueller's Day Off*, *Weird Science*, *Tron*, *Brainstorm,* and *Short Circuit* to name just a very few that prominently featured personal computing technologies. In print fiction, around 1984, with the publication of William Gibson's *Neuromancer*, cyberpunk, a self-described rebel offshoot of science fiction, established itself as a cynically hip, totally 'now' genre, relying heavily on the aura of cool, of new-ness, and of power that collected around new personal computing technologies to do so.[14] These narratives resonated well beyond the traditional science-fiction genres and audiences: cyberpunk, especially Gibson's works, enjoyed unprecedented mainstream crossover success. Many self-described cyberpunk authors believed (and proclaimed) they had special insight into the brave new world the computer was seen to be bringing about on manifold cultural fronts. Speaking to the pandemic preoccupation with new computing technologies, Bruce Sterling makes a case for cyberpunk as a privileged site of engagement. In his introduction to *Mirrorshades: The Cyberpunk Anthology* (1986), Sterling writes that "[c]yberpunk is a product of the Eighties milieu—in some sense … a definitive product" (x). He opines also on the appropriateness of the 'cyberpunk' moniker, arguing that it "captures something crucial to the work of these writers, *something crucial to the decade as a whole*: a new kind of integration. The overlapping of worlds that were formerly separate: the realm of high tech, and the modern pop underground" (xi; emphasis added).

On the more 'factual' side of popular culture, journalism and television were also quick both to describe the 'facts' of the machine and to extrapolate the imagined future of a computerized world: most obvious in this regard is *Time*'s selection of the personal computer as 'Machine of the Year,' but general-readership publications of all kinds featured breathless assessments of the new technology. Throughout the late 1970s and the 1980s, too, special-purpose computing magazines began to appear in droves, many of them aimed at a lay or beginner audience. Neither was historiography immune to this highly-contagious speculative fever: computer histories proliferated in the 1980s, and many of these gave full rein (at least momentarily) to Orwell-, Huxley-, McLuhan-, or Toffler-inspired flights of cultural fancy in their descriptions of new or almost-here personal computing technologies, in addition to regaling the public with riveting tales of engineering derring-do among personal computing's pioneers. In *The Making of the Micro: A History of the Computer*, for example, Christopher Evans veritably gushes with enthusiasm for the "staggeringly different" future that he saw just around the corner (10). He writes that this brave new world will be "a future which is largely moulded by a single, startling development in technology whose first real impact is now beginning to be felt. The piece of technology I am talking about is, of course, the computer" (11). History cannot suppress a utopian prognosticatory impulse, a glee that technology will trump literary nay-sayers: Evans notes about his prized personal computer that "it is significant that the word [computer] doesn't appear once in either *1984* or *Brave New World*" (11). On television, the new kind of computer made an early appearance in 1976, when journalist Tom Snyder gleefully played a video game called *Target* on his *Tomorrow* program. Alluding to mainframe computers' generally poor reputation among the general public at the time, Steven Levy notes that this program segment "was perfect for showing [the host] and a television audience a new way to look at those monsters shrouded in evil, computers" (243; see also Frieberger and Swaine, 166).

I have tried here to indicate, as *Time Magazine* noted in all their editorial wisdom and publishing savvy, that there was *something special* about the personal computer in and around 1983. As Sterling hints in his promotion of the cyberpunk worldview, a number of things seem to be happening at the same time that cannot be totally causally explained by recourse to a simple technological determinism, that seem to demand a more imaginative intervention. The computer industry did change radically, post-IBM PC, but why did it not jump on the microcomputing bandwagon sooner? Alternatively, with its solid mainframe business not only intact but growing, why did it jump at all? In the realm of popular culture, also, no simple explanation for the decisive shift in representation avails. For years, Hollywood had been depicting computers as Levy's 'monsters shrouded in evil': what catalysed the move to a more positive characterization? Why, also, the crossover success of *Neuromancer*? How did the computer come to infect so completely the imagined futures of so many people who had never even touched one? It is the work of this dissertation to begin to answer these questions, by taking a wide view of the discursive circulation of the personal computer in the 1980s. The title of this work, "Becoming the Universal Machine: Creating the personal computer in 1980s literary and popular culture," hints at the tack I will take to do this. Rather than conceiving the personal computer as either a wholly engineered or a totally imaginary technology, I have in view a hybrid machine, a machine built not only from the more nuts-and-bolts history of the personal computer but from its narrative 'incarnations' as well.

A history 'for the rest of us'

In 1984, Apple marketed its first Macintosh with the tagline, "A computer for the rest of us." Similarly, I here propose to write a computer history for 'the rest of us,' to trace out how 'Joe Turkey User,' the naïve non-nerd scoffed at by many of the hackers and engineers who started the 'home computer revolution,' became convinced that the personal computer was, well, personally meaningful.[15] I want to focus on the establishment of the ideology, first articulated during the early 1980s, of the microcomputer as 'personal computer,' a technology of boundless potential and scope acting for individual rather than institutional agents. This project seeks to apprehend the narrative construction of the partially physical, partially speculative, decisively material technology that has come to be known as 'the personal computer.'

To do this, I turn away from a fact-based reconstruction of the microcomputer's lineage such as can be gleaned from the hacker biographies, corporate histories, and tales of entrepreneurial pluck that comprise the canon of literature on the personal computer. I focus my attention instead on the imaginative representations of the new technology in popular culture. In doing this, I attempt to capture both the ubiquity and the power of the prophecies, hyperbole, and excitement that attended the cultural paving-of-the-way for the imagined machine as a soon-to-be *materially* universal technology.

I contend that studying the emergence of discourses surrounding the new 'personal computer' of the 1980s constitutes a cultural-materialist intervention in the terms that Rosemary Hennessy lays out in her *Materialist Feminism and the Politics of Discourse*. In this book, Hennessy undertakes to resolve a dilemma that dogs both feminist and postmodernist theory, namely the difficulty of determining the relationship and/or boundary between what is categorized as the *discursive* and the *material*. The discursive is generally understood to encompass text (in literary studies) or the 'superstructural' elements of society (in Marxist thinking). The material, on the other hand, is generally conflated with the experiential real and thus is understood to consist of more physical artifacts and intractable extra-discursive structures (i.e., class systems, modes of production), amenable to modes of criticism concerned with actuality rather than representation. Such conceptions of the material can, and often do, posit essential notions of identity or corporeality that are deemed real because of their perceived location outside of discourse. The dilemma, as Hennessy notes, is that if theorists fail to establish the means by which the 'discursive' and the 'material' intersect and interact, it is impossible to coherently analyse the means by which the products of culture, its entertainments and other 'superstructural' elements, participate in determining the material conditions (of production, or of identity, for example) under which we all labour. From this incapacity can spring both a dismissal of the importance of literary production, aesthetic practice, and popular cultures and a sense of the futility of political intervention via participation in these cultures; corrollary to this dismissal is an essentialization of the (positivistic) real.[16] Ultimately, claims that the material is imbricated with the discursive fail to be compelling if the means by which they interrelate are not clearly articulated, and if the harder-to-pin-down material is always, at base, deemed to be beyond the reach of discourse. On the other hand, establishing a rigid boundary between the material and the discursive effectively limits the relevance and action of discourse-based theories that hope to set agendas for real social transformation.

Hennessy offers as a remedy to this impasse the concept of *discourse-as-ideology*. In this construction, the 'real' consists of material conditions experienced and processed via frames of reference discursively constructed. This theory, rather than seeking to rigidly separate an idea of the 'discursive' from that of the 'material,' construes lived reality as *materialized discursivity* by linking the narrative/textual emphasis of discourse theory to Althusserian Marxist theorizations of the interpellative nature of ideology.[17] Discourse-as-ideology links the idea of (narrative, discursive) intelligiblity to political and economic practice. By adding Antonio Gramsci's notion of hegemony into the mix, which notion distinguishes between dominant and subordinate discourses in an assessment of power differentials, critics following Hennessy can achieve greater degrees of nuance when analysing the interrelations between discourses. It is on the basis provided by this conceptualization of discourse-as-ideology that this dissertation can claim that the speculative, imaginary, and fictional representations of the microcomputer across a variety of discourses in lived 1980s popular culture constitute an important intervention in the construction and adoption of the rhetorical artifact now known as the 'personal computer,' and exert a determining effect on its material impacts on that society.

When the personal computer was chosen as 'Machine of the Year' in 1983, there was a significant disproportion between the number of people who actually used the new machines and the world-changing effects these machines were widely felt to portend. This gap was bridged through startling overlaps between 'higher' literary preoccupations, genre fiction, and mainstream popular media. These discourses produced texts that glossed over, filled in, and explained away the incommensurability between what the microprocessor-powered machine could actually do and its vaunted just-around-the-corner potential. Significantly, if it was all-powerful in the cultural imaginary in the 1980s, the personal computer was also, in a very real sense, nothing at all—an overdeveloped technology in a culture that had an underdeveloped sense of what to *do* with it. Importantly, it was the *idea* of the personal computer, much more than any individual machine, that seized the public imagination. The imaginary construction of the personal computer we have come to know as a machine owned and used (and, in many cases, even *built*) by individual consumers as a tool of personal empowerment, and the ubiquitity of this construction across a range of cultural discourses and communities, was in large part the result of the technology's narrativization in the imaginative realms, rather than immanent within its hardware or software.

Along with a reconfigured notion of the materiality of discourse, Hennessy outlines a critical method appropriate to its apprehension. Understanding discourse as ideology, materialist feminism 'reads' culture as any number of constantly-contested social 'texts,' finding gaps or aporias in hegemonic narratives, and exploiting these moments of ideological contradiction in order to put forth alternative narratives. This process constitutes an engagement with lived culture, in that the discursive construction of this culture is understood to render its more physical and seemingly extra-discursive aspects legible within a common frame of meaning: the construction and dissemination of narrative participates in the establishment of the real. The main critical strategies described by Hennessy are those of critique and symptomatic reading. Critique is understood as a form of political consciousness raising; by reading the gaps in the narratives offered in hegemonic discourse(s), and offering alternative narratives in their place, a strategy of critique aims to disrupt the relations and subjectivities enabled and constructed in hegemony. Similarly, symptomatic reading, a politicized version of Freud's analytic, reads these same gaps as symptomatic of the hegemonic discourse's inherent contradictions, as constituting the dream of the repressed; this strategy draws out the alternate logics which 'haunt' dominant discourse. Hennessy's methodology is well-suited to my project, as what I am proposing to do is precisely to pick apart at some of the holes in a particular discourse—'personal computing'—at the moment of its emergence into various spaces in the cultural limelight in the 1980s. My aims are to complicate any simplistic reading of the personal computer of the 1980s that would read this object as an unsophisticated machine whose technologies and importance have long since been overcome, as well as to question the taken-for-granted truths of computing culture. By disarticulating hegemonic texts according to the gaps they manifest, critics wield a powerful tool of social change, because such a disarticulation proceeds hand in hand with the construction of alternate social narratives, or, at the very least, the destabilization of hegemonic narratives that had earned common-sensical, unquestioned status: the hegemonic narrative here is that of the revolutionary, individualistic 'personal computer.'

Materialist feminism, according to Hennessy, must employ a global analytics; that is, it must define a methodology that both acknowledges the global reach of capitalism and patriarchy and employs 'global' reading strategies stressing the interconnectedness of the multiple, variously overlapping discourses that make up lived culture. Accordingly, this dissertation examines numerous texts issuing from various popular discourses, and employs them to reconstruct a coherent, wide-ranging, but not totalizing overview of the meaning and operation of the 'personal computer' in North America in the 1980s. The 'personal computer' that I take as my object of analysis—'Machine of the Year' and 'computer for the rest of us' at one and the same time—is to be found in the popular cultural texts that articulated it: in the Hollywood movies, in cyberpunk, and in the for-beginners press that put out manuals and glossaries and generally proselytized to the lay population. That these less-than-expert texts were essential to the domestication of the personal computer is evidenced in their repeated citation in more learned venues, where the possible future of the machines was imagined. Marshall McLuhan counsels that, at the moment of the introduction of a new technology into culture, it is the medium itself which is the message of concern to the cultural analyst.[18] This is what he means by his most famous catchphrase, "the medium is the message." In the case of the current project, the means by which the pre-existing notions of 'computer' is the primary content of the newer medium of persona computing: the message is the means by and purpose to which the microcomputer remediates the medium of computing, a set of narratives demonstrating how 'personal computing' itself is made to mean in culture as a distinct object and set of practices. Hennessy's methods and rationales support my contention that cultural representations constitute material, lived reality for subjects in culture. Her assertions that the articulation of particular, local subjectivities are to be read in the context of global systems of domination is particularly relevant to this project, adding coherence to the wide assortment of texts I employ to triangulate an ideologically functioning 'personal computer' by the end of the 1980s. This is how my work differs from straight computer historiography, as well as from a purely thematic or formal literary analysis of narrative.

Bootstrapping

To a greater or lesser extent, historical treatments of the personal computer have told the story of the technological avant-garde; that is, they tend to focus on the specialist technologies, as well as the specialist workers and thinkers, who made feasible the microcomputer asengineered artifact. Alternatively, they concentrate on prognosticatory and utopian readings of the social uses of personal-use computers as yet undreamed-of on any known production line. All of these narratives are too narrow in scope to explain how and why a general purpose news magazine like *Time* would choose to celebrate the personal computer as 'Machine of the Year' and find a responsive and ready readership. Where such mainstream media acknowledgements of the new machine are referred to in these histories, it is in the context of self-congratulation, used to indicate that the personal computer *was* finally widely recognized as a 'revolutionary' technology, and not to investigate *why* or *how* this new view came to be commonly held. Indeed, as it is the founding assumption of most computer histories that the computer both exists and is worthy of study, these texts cannot interrogate the force, provenance, or consequences of this belief: caught up in a mass of (interesting and important) details, they miss the (ideological) forest for the (technical) trees. This is an important gap in scholarly apprehensions of the 'home computer revolution.' Histories of computing and computers, including those published at the dawn of this 'revolution' in the 1970s as well as those written subsequently, have offered no theory of the new machine's operations as a compelling narrative object in culture. Neither have historians generally been much interested in interrogating the rhetoric of revolution that accompanies their accounts of the birth of individual-use computing. On the other hand, literary and cultural theorists past and current have undertaken such analyses of the computer as cultural object; however, this work mostly deals with much more advanced, later, networking, simulation, and gaming technologies. Where theorists do address the machines of the 1980s, they have, like the historians of that decade, directed the bulk of their attentions to the material computer and to the directly-experienced and ideologically significant effects of its operations *as a physical artifact* in culture. Neither camp has examined the relationship between this material computer of home and office, the rhetorical computer of speculative journalism and prognosticatory academic writing,[19] and the imaginary computer of popular fiction in any sustained or comprehensive way.

Certainly, valuable academic treatments of information technology increasingly abound, but these cluster around the Internet; virtual reality; the cyborg as creature of fiction, of lived reality, and theory; and 'cyberspace' in variously materialized or dematerialized forms. Most of this work has appeared since the early 1990s, in the context of the latest technological marvels, the Internet and the World Wide Web.[20] Works that date from, or deal explicitly with, the information technologies of the 1980s constellate around two poles: one end of the spectrum comprises the heavily material analysis of the deployment of various information technologies in culture, while the other consists of highly abstract treatments of the computer as a theoretical object useful to the pursuit of lofty pronouncements on late twentieth-century culture writ large.[21] In between these extremes lie individual readings of filmic and literary texts that feature computers, of genre fiction and the subcultures they create and describe, and of the relative merits or levels of verisimilitude of one vision of computing technology over another. These readings are neither numerous nor systematic, and at the time of this writing, the popular texts I undertake to study have received none-to-scant critical analysis. The very little scholarship that does exist is mostly published in the decade under examination. No recent scholarship, so far as I have been able to discern, has stepped back to consider how the 'personal computer' operates discursively in the 1980s across a range of public cultures; certainly very little scholarship distinguishes the microcomputer from its technological antecedents in ways I feel are necessary to understand the role of 'personal computing' in the 1980s.

Thus, in tracing the machine's circulation as an imagined cultural object and, further, claiming that the personal computer is 'born' into the mainstream of North American culture in the early 1980s through these narrative representations, I undertake a new kind of historical project, informed by Hennessy's articulation of discourse as ideology and Allucquère Rosanne Stone's idea of materialized discursivity. This kind of history-writing breaks with several established practices. First, it disrupts the timelines and causal links that structure standard computer histories. Foremost among these deviations is my assertion that the 'personal computer' is born from a broad popular recognition of its existence as a certain kind of machine, rather than from breakthroughs in engineering and programming. This shifted causality leads me to place the birth of the personal computer contemporaneous with the *Time* "Machine of the Year" piece in 1983, while standard histories, tracing technical rather than cultural factors, generally accord this honour to the launch date of the MITS Altair in 1976.[22] Second, this reconfiguration of the lineage of the computer inverts the causal relation generally posited between a technology and its representation: I argue that the ways that non-expert users and armchair philosophers—'J. Random User' in hacker parlance—imagined the new machine exerted a strong influence on the evolution and deployment of the evolving material artifact, variously called the 'personal computer,' the 'home computer,' or 'the microcomputer,' in lived culture. Importantly, in most cases this involved conceiving a notion of the new computer's character, purpose, and relevance to their lives before ever interacting with one. In light of this fact, in my analysis of the role of the 'personal computer' in 1980s popular culture, I give precedence to the representation rather than to the material artifact, as these have generally been understood to be distinct. This practice leads to my third break, perhaps most heretical: in contrast to much of the scholarly and popular works on the computer and computing culture, I have no agenda to 'set the record straight,' to inculcate a 'right' vision of a computerized society, or to promote a 'correct' use of the machine. Where expert fact contradicts popular opinion, I give analytical weight to popular opinion: this is why, in this history, the IBM PC is a more important computing milestone than the MITS Altair. Regardless of the Altair's important position in the history of personal computing technologies, very few people beyond the dedicated hobbyists, who built it from kits and toggled its little switches until their fingers blistered, ever heard of it. I certainly do not intend to dispense with facts; on the other hand, I have no interest in collapsing the gap between the imagined computer and the ostensibly 'actual' one. It is precisely the cultural work that goes into bridging the two that I here take as my object.

I am obviously not the first to attempt to write a history of the personal computer. The topic has been subjected to endless treatment, both scholarly and popular, and has also generated a number of book-length 'eyewitness' accounts that fall somewhere in between the two. In all these genres the machine has usually been apprehended as a purely technological artifact.[23] Generally, the standard historical narrative sees the personal computer nurtured into existence by various leaps in structuring technologies, aided by individual entrepreneurial zeal, and hindered by old-fashioned thinking. Within this basic frame, these histories are fleshed out by the emphasis of many of the following narrative elements in a teleological arrangement that posits the current state of the art as a pinnacle of achievement: the history usually begins with Babbage's ill-fated but brilliant Analytical Engine (thwarted by hidebound bureaucrats who held the purse-strings), moves through the first American super-calculators (ENIAC and the Harvard MARK I) and British codebreakers (COLOSSUS) into the reign of the IBM 700-series business mainframes (sold and designed by hidebound bureacrats, who, further, monopolized the marketplace), reaches a climax with the home-brewed construction of the Altair-8080 in Albuquerque, the first personal computer, and winds down with self-congratulatory tales of the boom of Silicon Valley micro-computer-related businesses (hardware and software) in the early- to mid-1980s.

In popular historiography, like Freiberger and Swaine's 1984 *Fire in the Valley*, the 'biography' of the personal computer is written as the story of essential and wondrous machines promoted or suppressed by forward-thinking or behind-the-times men.[24] These treatments are thinly veiled advertisements for the personal computing way of life: they proselytize the lay population with exciting tales in which the personal computer and those who are receptive to the revolution are the heroes. Popular histories like *Fire in the Valley* are structured like a good thriller. They generate suspense as the personal computer, the true hero of the narrative, interacts with the various supporting characters who will aid or impede its progress. Other modes of popular historiography have a different focus. Eye-witness accounts, like that of David E. Lundstrom in *A Few Good Men From Univac* (1987) or the engineers and programmers of Tracy Kidder's Pulitzer Prize-winning *Soul of a New Machine* (1981), try to secure the author's or subject's place in history by individualizing aspects of the larger 'revolution.' These narratives often seem to have a record-straightening intent, and show their protagonists to be befuddled and concerned by the inflated rhetoric and heroic scale of the popular histories. Scholarly histories of the computer must be distinguished from their more mainstream and marketable siblings. These texts aim to sort out precise lineages, to date innovations as precisely as possible, and to give credit where credit is due: this is no easy task, especially in the 1980s, when lawsuits were flying fast and furious as thwarted and overlooked inventors tried to reassert their contributions to the technical side of computing. Scholarly histories also investigate the material—that is, the economic and in some cases the political—impacts of computing technologies on culture. This is admirable and important work, and I draw on it in the service of writing this history. I wish, though, to operate with a richer understanding of what constitutes the material impact of computing technologies on culture. Scholary histories are, in the main, much more concerned with following a causal chain of physical evidence than I care to be; they are also undertaken with less emphasis on literary and popular representations than I aim to direct to the task. What these texts neglect are the relationships between the represented machine, the ideological machine, and the engineered machine.

A notable exception to this trend is Paul Edwards's *The Closed World: Computers and the Politics of Discourse in Cold War America*. As the title indicates, Edwards's book is a study of Cold War politics that, while it takes computing technologies as a primary object of study, subordinates the engineering-based history of the machines to an analysis of the enabling cultural conditions (discourses) that allow such machines to arise as legible cultural agents. Other critics and theorists have promoted this kind of reading of 'high' technologies as well, although they do not address the personal computer in detail or at length. Donna Haraway, Allucquère Rosanne Stone, and N. Katherine Hayles, to name three notable examples, each sketch out critical practices to apprehend this computer and explain, further, why such analysis is important. Haraway is perhaps best known for her "A Cyborg Manifesto: Science, Technology, and Socialist-Feminism in the Late Twentieth Century" (1991, originally 1989); however, much of her other writing concerns the computing, biological, and general-scientific discursive apparatuses and techniques that create the conditions in which the cyborg identity and politics germinate. While Haraway does not take as her primary object the discursivity of computers, her body of work on the cult of technoscience, as well as her articulation of a counter-hegemonic 'cyborg' politics appropriate to the political realities of life under technoscience, offer much that is of use to my own project. "The cyborg," she writes, "is a condensed image of both imagination and material reality, the two joined centres structuring any possibility of historical transformation" ("Manifesto" 150). Haraway suggests that critics look to imaginative representations of the informatics of domination, and of technoscience, to fully apprehend the weight of these practices and beliefs on culture.

In her own writing, Haraway reads quite diverse texts: the feminist science fiction of Octavia Butler and Ursula LeGuin ("Manifesto"); the conditions of labour and production creating the silicon chips that drive the high-tech devices of the informatics of domination ("Manifesto"); the world's first patented animal, the genetically-engineered cancer-research rodent trade-marked as 'Oncomouse' (*Modest_Witness*); scientific trade magazine advertisements for DNA-related research tools (*Modest_Witness*); the *SimLife* videogame (*Modest_Witness*); and patent legislation in the United States (*Modest_Witness*). Haraway's wide-angled critical lens, is predicated on a generous definition of 'text' and a porous understanding of both 'imagination' and 'materiality.' In *Modest_Witness@Second_Millenium*, Haraway links the operations of a new world economy to more 'imaginative' cultural practices even more explicitly: "Power," she cites Susan Leigh Star as writing, "is about whose metaphors bring worlds together" (39). Like Hennessy's program for materialist feminism, Haraway's critical model collapses the distinction between a so-called objective material reality and the more subjective practices of social and cultural life. Haraway reveals the contradictions inherent in such a separation through recursive and nested definitions and redefinitions of her terms, and by encouraging theorists to inhabit the spaces between opposing terms. For example, she characterizes the cyborg as both a "matter of fiction and lived experience," conceiving this subject-position as a narrative and social practice rather than as an essential being-in-itself ("Manifesto" 149). "Science," she similarly asserts, "is cultural practice and practical culture" (*Modest_Witness* 66). This last tautology is the third aspect of Haraway's articulation of the representational behaviours of technoscience. Two other aspects of this articulation are germane to my project. First is the assertion that the supposedly dry, rational, and objective discourses of technoscience are, in fact, replete with figures, with narratives; technoscience's vaunted "facticity [is] always saturated with metaphoricity" (*Modest_Witness* 64). Second, Haraway notes that technoscience "engages promiscuously in materialized refiguration" (*Modest_Witness* 64), suggesting that the so-called extra-discursive physical real is in constant flux, hardly a stable or solid fixture. These observations culminate in the paradoxical conclusion that technoscience becomes the stories it tells about itself, in a process as much based in narrative construction and repetition as in the recounting of observable and objective 'fact.' Bearing this in mind, I will treat the computer as Haraway does the cyborg, as "a fiction mapping our social and bodily reality and as an imaginative resource suggesting some very fruitful couplings" ("Manifesto" 150).

Allucquère Rosanne Stone also emphasizes the powerful role of narrative in the domestication of new technologies. Stone graphically demonstrates this power of narrative in her introduction to *The War of Desire and Technology at the Close of the Mechanical Age* (1995). Here, Stone narrates her own induction into technophilia via the recounting of several seminal, if fragmentary, childhood experiences: a first encounter with a sound studio, the thrill of ham radio late at night. These stories are personal and confessional. In an endnote, though, Stone relates that she has fictionalized the narrative, as the original version of events was not nearly so immediately relevant or compelling. The printed version, a dramatic reenactment, if you will, collapses elapsed decades into emblematic moments, takes great liberties with technical facticity, and features set design courtesy the first *Superman* film (185n1). Like Hennessy, who voices a similar skepticism about promoting simple cause/effect relationships, Stone introduces a critical mantra of "no causes, no effect, mutual emergence" to reinforce the imbrication of narrative, culture, engineered technology, and ideology in constructing selves as well as artifacts (21). Haraway, too, offers a similar caveat against simple determinism, writing that "the relations among the technical, economical, political, formal, textual, historical, and organic are not causal. But the articulations are consequential; they matter" (*Modest_Witness* 68-9). Like Haraway's resolutely partial cyborg, Stone's mantra compels us to understand the social universe as something as much inscribed as discovered, as much narrated as revealed. More than Haraway, though, Stone examines this process in the context offered by new (computing) technologies of communication, simulation, and representation. "Technologies," she claims, "can be seen as simultaneously causes of and responses to social crisis …. as ways to stabilize self/selves in shifting and unstable fields of power" (88). Thus Stone 'discourse surfs' her way through the Internet age, offering the notion of materialized discursivity to describe the stabilization of self/selves, and questioning the overlaps between identity politics, the practices of computer-mediated communication (CMC), and the narrative conception of 'cyberspace.' Stone's work makes up part of the emerging canon of cyberculture studies. Other scholarship in this new field concentrates its efforts on a later body of texts, and with regard to a later technical revolution than the one I take as my object—cyberculture studies leans heavily toward analysis of the increasing cultural penetration of the Internet across the same areas of life previously infected by the home computer revolution. While the mass of work in cyberculture studies deals with materials a decade beyond the time period I am concerned with, this field similarly grapples with the tensions between material facticity and imaginary representation, and with the uneasy linkage of the two into the unstable materialized figuration of Haraway's thinking.

As this dissertation will show, the 'home computer revolution' of the 1980s reconfigured the microcomputer as both the 'personal computer' and as the *universal machine*, constructing the former as a privileged ideological object and establishing the latter as a key agent in the emerging social reality that Haraway comes to name the "informatics of domination" ("Manifesto" *passim*). This process also set the ideological stage for the 'Internet revolution' that now garners so much more critical attention. This later revolution can only be partially understood apart from the earlier context; I hope to redress the gaps in current cybercultural scholarship by developing a periodizing hypothesis that links the rhetorical ubiquity of the personal computer in the 1980s to the peaking of a particular cultural moment I will designate as postmodern, and then embedding this moment in a broader historical trajectory I call 'technoculture.'

Rationalizing Technoculture

What the historical and imaginative treatments of the computer have tended to write is a rationalization of technoculture. This rationalization applies across three axes: "to interpret from a rational standpoint," "to bring efficiency to," and "to devise self-satisfying but incorrect reasons for" (*American Heritage Dictionary* "Rationalize"). Technoculture is a term which describes not only the present state of our technologies, but also our attitudes towards our pragmatic and imagined relationships to these technologies. Technoculture names a common cultural reality that earlier writers, in pursuit of their own purposes, or marked by different times, have variously designated 'the informatics of domination,' 'global village,' 'the postmodern condition,' 'technopoly,' 'the age of simulacrum,' and 'the third wave.'[25] Such writers not only take issue with the operation of computing technologies in and on North American culture, but also identify the resulting technocultural society as fundamentally ideological, one in which we have chosen to understand the technology in such a way that it functions the way it does. 'Technoculture' is an ideological orientation as much as an objective physical reality. Like Haraway's vision of technoscience, a technocultural reading of the birth of the personal computer must necessarily take into account both the historical and imaginative record; like Hennessy's materialist feminism, it must employ a global analytics that looks beyond the current moment. In *Times of the Technoculture: From the Information Society to the Virtual Life* (1999), Keven Robins and Frank Webster use 'technoculture' to name the field of human/technology relations from Luddism in the nineteenth century up to the 'information society' of today, tracing the emergence of scientific management in the early twentieth century, and concluding their text with a skeptical analysis of the vaunted'virtual life' of the current moment. Robins and Webster deflate some of the more immoderate claims about both the unprecedented nature and the unquestionable desirability of the information society by embedding this revolution in a context of previous problematic technological advances.

Robins and Webster's efforts are necessarily historically broad, if not so broad as those of Neil Postman, who, in his *Technopoly* (1992), taxonomizes the great sweep of history as three epochs he names "Tool-Using Cultures," "Technocracy," and "Technopoly." Using this tri-partite frame, Postman investigates how "technology became a particularly dangerous enemy" (xii). The process by which this 'enemy' begins to prevail, he argues, is initiated by a long tradition of linking perceived eras in human development to particular technological innovations that enable them, as in the designations 'stone age' or 'industrial age' (22). Although this nominative practice accurately reflects the fact that innovative "technology creates new conceptions of what is real and, in the process, undermines older conceptions" (12), it leads to a historiography that concentrates on the cultural end-effects of particular technologies, rather than on the perhaps more abstract nature of our relationship to the idea of technology itself. The latter concern structures Postman's history into the three eras named above. The third stage of his taxonomy, Technopoly, is the one currently playing out. Postman offers this definition: "Technopoly is a state of culture. It is also a state of mind. It consists in the deification of technology, which means that the culture seeks its authorization in technology, finds its satisfactions in technology, and takes its orders from technology" (71). I substitute 'technoculture' for Postman's 'Technopoly' because his conception of technology's function in culture, and the analytical logic it entails, are at once too pessimistic and too deterministic. Despite this, the state of culture he describes is compelling. Especially cogent is his elaboration of why and how Technopoly integrated itself so smoothly into American culture (53).

Postman's diagnosis of an American Technopoly in many ways coincides with Fredric Jameson's vision of postmodernism as the cultural logic of late capitalism, and with Jean-François Lyotard's linking of new "computerized societies" with postmodern social realities (3). Without question, any reading of computing in the 1980s would be impoverished by the omission of the idea of postmodernity and of postmodern theory from the analysis. Indeed, the discourses of a self-diagnosed 'postmodern moment' in the 1980s and of personal computing are so enmeshed as to be sometimes nearly indistinguishable. Technoculture, though, is still a different thing from postmodernism. Arguably, the cultural condition that named itself postmodernism is a *symptom* of technoculture. As Darin Barney points out, in many ways 'postmodernism' as a theory of late modern culture is far too implicated in technoculture to cast a critical eye upon it:

> If information technology is so central to postmodernity—if the latter cannot exist without the former—then postmodernism, on its own, cannot be expected to provide the tools for a disinterested understanding and judgment of this technology. For this, we require theories that, from a distance, help us "clarify what is at stake" in committing ourselves to this technology. (17)

Certainly, much of the writing that celebrates the advance of technoculture calls itself postmodern. Often, the narrative and aesthetic trappings of technoculture comprise what Veronica Hollinger calls 'cultural postmodernism,' or what Jameson identifies as 'postmodernism-as-style' (Hollinger; Jameson, "Cultral Logic"). Another view, exemplified in the writings of Lyotard and Jameson, is that postmodernism is a cultural condition as well as a representational trend. 'Postmodernism' in this more nuanced and encompassing sense consists of all of the 'postmodernisms'—aesthetic practice in high art and architecture, narrative trends in literature and popular cinema, advanced capitalist modes of production, and the overlap between the musings of high theory and the technologies of daily life—read together and integrated into an overarching analysis of the ways and means these pieces fit together into a coherent, lived, historical period. This view comes much closer to capturing what I've named 'technoculture.' Postmodernism, though, even in this more all-encompassing sense, does not speak clearly enough to the intimacy of our relationships to the technologies that underpin it, make it possible, although both Jameson and Lyotard gesture towards this.

In describing the 'postmodern condition' of his title, Lyotard commences by describing "The Field: Knowledge in Computerized Societies." Lyotard links a new social reality, appearing after the Second World War and associated with postindustrial modes of production, to the then-new technologies facilitating the conceptual and practical shift from knowledge to information, and from opaque, noisy States to transparent multi-national organizations as the central organizing feature of social life. Acknowledging both the pragmatic and ideological effects of new computing technologies on the emerging postmodern condition, Lyotard demonstrates that "along with the hegemony of computers comes a certain logic" (4). This logic manifests itself both in what it is possible for us to *do* (crunch and otherwise process larger amounts of 'raw data') and in what it is we *value* (the capacity to create links between chunks of information, rather than a mature knowledge of a limited field of enquiry).[26] In Lyotard's text, computers are recognized as both enabling technologies and carriers of particularly postmodern values. Strangely, though, Lyotard succumbs to the fatal glamour—the postmodern values—of information technologies. While he admits in *The Postmodern Condition*'s final paragraph that the computer "could become the 'dream' instrument for controlling and regulating" the postmodern condition, he also believes that it could aid in countering this trend, by making greater amounts of information more widely available (67). And so he offers universal access as a tonic that is "in principle, quite simple: give the public free access to the memory and data banks" (67). Now, although Lyotard links this access with the strategy of constantly renegotiating language games that he articulates throughout *The Postmodern Condition*, the proposal of universal access as a sufficient check on the excesses of this cultural condition is more simplistic than simple: linked so intimately with the performativity principle as Lyotard has shown it to be, can the computer so easily be made to function as a solution to the problems its very logic has been demonstrated to generate?

Technology is also central to Jameson's view of how postmodernism is apprehended and experienced in culture:

> The technology of contemporary society is ... mesmerizing and fascinating not so much in its own right but because it seems to offer some privileged representational shorthand for grasping a network of power and control even more difficult for our minds and imaginations to grasp: the whole new decentred global network of the third stage of capital itself. ("Cultural Logic" 37-8)

For Jameson, then, grappling with the *idea* of technology allows the cultural imaginary to approach the concept of the lived reality of postmodernism. Unlike Postman's formulation, here technology is not understood to comprise the whole of culture, nor to exert a truly deterministic influence (Jameson, "Cultural Logic" 35). Importantly, in this view, technology is essential to postmodernism, but it is not the thing itself. I therefore use 'technoculture' to name the intimate material and imaginary relationship of technology to postmodernism that both Lyotard and Jameson note but do not address at sufficient length. Cyberculture studies, the field of research in which I above placed Allucquère Rosanne Stone's work, often addresses this relationship, in some cases defining a working 'cyberculture' as precisely the arena in which high academic theories of postmodernism are lived, where fictional text and non-textual reality overlap, and where Haraway-esque 'cyborgs' are enacted as functioning subjectivities.[27] In their introduction to *Technoscience and Cyberculture*, Jennifer Rich and Michael Menser describe the collective project of the anthology thus: "each piece spotlights a nexus where culture, technology, and science intersect, alerting us to the ways in which this nexus is embedded in both practical and personal spaces" (1). In another essay, Menser and Stanley Aronowitz make this point even more strongly: "American culture is technoculture, from the boardroom to the bedroom. This is not to say that there is just one American culture; there are many, yet each is a technoculture" (10). Like Lyotard and Jameson before them, Menser and Aronowitz attempt to mark the special status of the technological and the scientific in Western culture. "Science," they write, "is not 'just another cultural practice or discourse,' nor is technology 'just another' set of objects" (8). Throughout the volume, 'cyberculture' and 'technoculture' seem to be used interchangeably, in reference both to new social realities that attend the increasing penetration of information technologies in daily life, as well as to the generally technophilic outlook that seems to characterize American culture—and has so characterized it from at least the turn of the twentieth century. This usage of 'technoculture' as well as 'cyberculture' speaks to contemporary dilemmas of nomenclature, and gestures towards the filiation of these analyses of high technology to larger historical and cultural trends. Nevertheless, to deploy the terms in this interchangeable manner fails to address their relationship to each other: implicitly, cyberculture is distinct because it is both a part of technoculture and yet coherent on its own. Conflating the terms obscures the relationship between the part and the whole. To separate the one from the other allows the critic to analyse precisely what makes up cyberculture, and how this cyberculture furthers the logic of a larger technoculture.

Framed, then, by an overarching diagnosis of a hegemonic technoculture in the 1980s, this project also presupposes the condition of 'cyberculture' as well. A hybrid word, 'cyberculture' blends two compelling, complicated, and seemingly mutually exclusive concepts. 'Cyber-,' notwithstanding its Greek roots in 'steersman' or 'governor,' and its initial adoption into the English language as a prefix designating self-regulating, closed systems, has become indelibly associated with all things very-high-tech, especially computers and global networks, in the mass imaginary.[28] 'Culture' has similarly slipped its etymological moorings and has come to denote sometimes competing visions of social life in the most general sense (e.g. 'late twentieth century culture'), élite art and literature ('high culture'), or specific sub-groupings of subjectivities in recognizable communities of interest ('teen culture,' 'academic culture').[29] To further complicate a straightforward understanding of what is captured by the designation, 'cyberculture' enacts in its construction the jarring collision of apparently distinct ideas: engineered technologies, especially *computing* technologies, and less-tangible, certainly less specific, human relations. As in *Technoscience and Cyberculture*, the term has come to be occasionally synomymous with 'postmodernity,' with 'technoscience,' and with 'technoculture,' however these terms are defined; it has also been conscripted to stand as the titular field of research for an emerging (inter-)discipline of cyberculture studies.

To name my area of study as 'cyberculture' is to mark my commitment to addressing the paradoxes enacted in the term's etymology, as well as the common space of their collision. Because there is no current gold-standard working usage of the term among self-described cybercultural scholars, though, I will briefly sketch out the way I use the concept in this work. For this I turn again to previous work in the field. *The Cybercultures Reader* is a recent massive tome that collects and introduces many canonical pieces of cybercultural scholarship as well as new work by emerging scholars. In his introduction, co-editor David Bell writes that the edition has the aim of defining a critical practice for the arena of online interaction known as 'cyberspace.' He asserts that "we need to read cyberspace at the intersections of technology and representation, and see the two as mutually implicated in constituting our approach" (3). Again writing particularly of post-Internet social realities, Bell specifically invokes the cultural as an important aspect of any critical apprehension of information technologies: "we need to consider the place of imagination and representation, cultural use and value, and focus our attention most squarely on human interactions with (and within) these emerging cybercultural formations" (1). For Bell, as for others in the anthology, 'cyberculture' is the cultural life of 'cyberspace.' This vision is, I feel, too narrow to properly apprehend the role of computing technologies in a broader public culture. Nor does it take into account the influence this broader culture itself might have on the culture it questions. Certainly, it is difficult to see how an analysis of the birth of the personal computer would fit into the cybercultural project, as Bell here articulates it.

Taking Bell's multi-disciplinary vision of cyberspace studies into account, but redressing the temporal poverty of his anthology's selections and focus, I further expand the definition of 'cyberculture' to cover the cult and aura of computing technologies generally, in addition to cyberspace and other 'virtual' realities already falling under the purview of that term. In my taxonomy, cyberculture is that aspect of technoculture that deals in computerized information technologies: cyberculture describes the 'home computer revolution' of the late 1970s and early 1980s as much as it does 'cyberspace' in the cultural imaginary in the mid-1990s and the e-commerce gold rush in the early 2000s, for example. My usage of the term both encompasses the idea of new cultural phenomena involving computer technology and, by relating cyberculture to technoculture, points to the fundamentally technologized nature of culture, period. It is not as though there is 'culture,' and then a cyberculture distinct from it: rather, there is first and foremost technoculture, and cyberculture is but one generically recognizable manifestation of that technoculture.[30] In the same manner as Orwellian Newspeak (only not working for the forces of evil, I hope), the consistent use of the word/concept 'technoculture' makes it impossible not to acknowledge the deeply technologized nature of contemporary thinking/living, while a related but subordinate notion of 'cyberculture' indicates the privileged role of computing technologies as material and imaginary tools for living in technoculture.

Cultural imaginings and grapplings with (comparatively) primitive home computing technologies in the 1980s, and the ideological coherence that began to take shape over the decade, have led to the materialization of particular visions of 'personal computing' in the technologies we currently employ in our navigations of 'cyberspace'. As Foucault argues in *The History of Sexuality, Volume 1*, discourses/power do not drop down from above, rather, they converge in lines of force from micro-discursive moments; he writes that "[p]ower is everywhere; not because it embraces everything, but because it comes from everywhere. And 'Power,' insofar as it is permanent, repetitous, inert, and self-reproducing, is simply the over-all effect that emerges from these mobilities, the concatenation that rests on each of them" (93). Foucault seems to be hinting that cultural hegemony/power take some time to develop, and that the process of development is one of very small discourses agglomerating into compelling and overarching social narratives. In miniature, I am tracing out much the same process in examing the trajectory from the hackers of the Apple II (1977) to the cyberspace of *Neuromancer* (1984). In that sense, it is neither anachronistic nor intellectually inappropriate to designate my work on the 1980s as cyberculture studies.

One further neologism is necessary to the work of this dissertation. I name 'cyberdiscourse' those specifically *narrative* aspects of technoculture that deal specifically with promoting the cult of the computing machine. The cultural history of the personal computer—that is, its representation on film, in fiction, and in journalism—describes the ideological condition of technoculture via narratives of the birth of personal computing, appropriate uses for contemporary machines, and extrapolative accounts of variously plausible computerized futures via *cyberdiscourse*. If cyberculture is that discourse-as-ideology of Hennessy's thinking, the materialized discursivity of Stone's, cyberdiscourse names the rhetorical modes proper to the materialization of that culture. In its construction as a term, 'cyberdiscourse' is meant to link, clearly enough, technology and modes of representation. Cyberdiscourse describes the discursive construction of technology; it names the means by which we cognitively map our relationships, as a culture and as individual subjects, to technologies that are in their turn structured by this cognitive mapping. Cyberdiscourse is a descriptive, rather than an evaluative, term. I by no means intend to suggest that discourses pertaining to cyberculture function any differently from the discourses of, say, religion or sex. I use the term to name those discourses that are my primary concern here, namely, the discourses that accrued around personal computing in the early- to mid-1980s; it is a convenient shorthand, and its blended constuction, like that of 'cyberculture,' is also and always a reminder of the mutual implication of technology and lived social relations.

Becoming the Universal Machine

During the 1980s and into the 1990s, the personal computer has moved from being ubiquitous only in popular cultural representation, to being ubiquitous in personal, daily life. Functioning as an economic, cultural, educational, and political *deus ex machina,* the 'personal computer' appeared as a central character in a number of competing stories told in a variety of media: science fiction, cyberpunk, postmodern theory and literature, the popular periodical press, Hollywood cinema, and feminist theory all wrote seemingly definitive visions of the new, unmarked, machine to embody their idea of both the now of the 1980s and the possible, computer-enabled future that is our present moment. Part I, "Legacy Systems," accordingly, traces the long narrative history of computers and what I characterize as 'computer-like machines' in literary and popular fiction, film, and journalism. This history is likened to a computing 'legacy system,' a large and inelegant but essential tool of daily practice. The representational legacy system of this section is comprised of the accumulated representations of computers and computing in the many texts, from the late nineteenth century onwards, that seek to understand the technologization of culture via the construction of narratively plausible computer-like machines: competing and contradictory representations of computing technologies span the better part of a century. As the public apprehension of technoculture broadly and computing more specifically altered with time and circumstance, a hodgepodge of 'computers' competed for imaginative dominance. The sign 'computer,' as it circulated in popular culture by the mid-1970s, is the sum of this process, and is the foil against which the personal computer attains coherence as a distinct object.

Part II, "Machine of the Year: The Computer Moves In" shows that a decisive shift in both literary representation and popular reception of computing machines occurs in the early 1980s. The dread object narrated by the legacy system at the end of the 1970s is reconfigured as the small, unthreatening, individually empowering 'personal computer' across a range of texts at the turn of the decade. These texts participate in the narrative reconfiguration of the material technology known as the microcomputer into the social object which becomes the 'personal computer.' This section addresses the narrative excesses of the purely imaginary computer of popular fiction: these texts rationalize technoculture by devising "self-satisfying but incorrect reasons" for the computerization of society. Three chapters examine three main modes of representation that accomplished the distinction of 'computer' from 'personal computer' and key these modes to broader and more general cultural anxieties and desires. It becomes clear that the apparent cacophony of representations and machines issuing from Hollywood studios, from cyberpunk pens, from computer industry ad campaigns, and from what I call 'speculative journalism' disguises a basic ideological coherence. This coherence consists of the unchallenged assumption that the personal computer would forever change culture, that such change was inevitable, and that there was a certain imperative to address and promote this change as quickly and comprehensively as possible.

Part III, "The Universal Machine," builds on the literary readings of the earlier chapters to offer a more theoretical take on 'personal' computing. The chapter outlines the distinctions between the 'personal computer' of popular culture and the popular imaginary, and the 'Universal Machine' that operates materially and ideologically on subjects of those cultures. The Universal Machine, I argue, is Lyotard's performativity principle incarnate; the insidiousness of this reality is disguised by those discourses of personal empowerment and liberty that pervade constructions of the personal computer. Specifically, I draw on Michel Foucault's diagnosis, in *Discipline and Punish*, of a fundamental tension between an individual's self-perception as juridical subject ("memorable man") and his/her actual material status as subject of discipline ("calculable man"). In the age of the personal computer, over the course of the 1980s, this tension is narratively resolved by an increasing willingness of subjects to identify positively with the 'calculable man' position: to see oneself as a subject of discipline becomes, via narratives of newer, seemingly personally-empowering kinds of computing, *desirable*. Ultimately, the Universal Machine rationalizes—brings efficiency to—technoculture in ways that put the lie to the promises of the personal computer. This is effected through a figurative and linguistic sleight of hand that heroizes subjection to discipline.

This project is especially timely as we currently stagger through yet another technological revolution, namely the accelerating adoption of Internet technologies across commerce, education, politics, and entertainment—across, in short, most of the realms of public and private life for citizens of the Western world. This current 'revolution' in large part replays the central themes that underpinned the 'home computer revolution' and structured its birth narratives. Because we are currently in its throes, it is difficult to assess whether the claims made for networked technologies will pan out or peter out—it is helpful and necessary, though, to contemplate the very similar personal computer revolution that played itself out at a more comfortable historical distance, in the early- to mid-1980s. In both revolutions, the fundamental pre-condition of a desirable and attainable 'technoculture' is never questioned; in both, the spotlighted technology is posited as near-universal in scope; and both, finally, are distinguished by an accelerated pace of change, with an undercurrent of worry that any time devoted to thoughtful analysis allows the train of progress pull further away from the station, leaving the thoughtful analyst on the platform for history to forget.

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[1] I choose this date because ENIAC, the machine non-specialists often hear referred to as the first computer, began operating in 1945. Paul Ceruzzi, in *A History of Modern Computing*, asserts that a bona fide American computing industry begins following the Second World War (7). The Harvard Mark I, also, was operational by 1944, and the authors of *Fire in the Valley*, a popular history of personal computing, claim that this machine "was widely hailed as the electronic brain of science fiction fame made real" (Freiberger and Swaine 7). ENIAC ('Electronic/Numeric Integrator and Calculator'), according to Ceruzzi, was "the machine that began this era" (Ceruzzi 21; see also Freiberger and Swaine 8-9, Wulforst 5-6).

[2] A 1976 Time/AFIPS poll (examined in Part III) outlines this familiarity.

[3] Ted Nelson, in his *Computer Lib/Dream Machines* of 1974, references these technologies, among others, that laypeople would have encountered in daily life.

[4] SABRE is an acronym for 'semiautomatic business research environment' (Cerruzzi 250, 395).

[5] This access, licit and not, is well-documented in Steven Levy's *Hackers: Heroes of the Computer Revolution*, especially in "Part 1: True Hackers." Such a form of use is what was originally meant by the term 'interactive computing'—real-time computation by individuals operating the machine themselves.

[6] Of course, from the time that Apple set up its corporate 'campus' at One Inifite Loop in Cupertino in 1978, the computing industry has become famous for fostering the kind of behaviour I'm here noting was considered aberrant and unproductive in the 1960s and 1970s. Douglas Coupland's *Microserfs* (1995) offers a fictionalized insider's view of office nerf wars, free pop machines, and bizarre work schedules; Steven Levy's *Hackers*, on the other hand, outlines the various 'lock hacks,' political infighting, and generally treasonous behaviour that hackers at MIT in the 1960s and 1970s resorted to to maintain this same lifestyle. Call it hackers' revenge. Nevertheless, prior to the 1980s, computing was an industry run by engineers thinking in 10 year product cycles; corporations with computers were of the blue-chip, established variety that processed data *en masse*, like insurance companies.

[7] This tale of hackers versus the priesthood is a powerful myth in the hagiography of the personal computer. I offer it here in the broadest terms in order to demonstrate how and why 1983 and the personal computer are markers of cultural change. I will offer a more critical interpretation of this myth in Part III: "Universal Machine".

[8] Most famous, perhaps, is IBM chairman Thomas Watson's 1943 assessment of the future of the computer: "I think there is a world market for maybe five computers" (Freiberger and Swaine 1). This unfortunate quip is often trotted out (in this instance as an epigraph to the opening chapter of *Fire in the Valley*) as an example of the complete incapacity of Established Industry to acknowledge the potential of personal computing, or to even participate in the 'home computer revolution.'

[9] Another famous example: an employee of Hewlett-Packard when he developed the original Apple computer, Steve Wozniak had a contractual duty to offer the machine to the company for development. He did so, and was given permission to toy with it on his own, as it was deemed a technology useless to HP (Freiberger and Swaine 25-6).

[10] To get a sense of the industry's retrospective take on the importance of the IBM PC, see the twentieth-anniversary retrospectives of August 2001put out by *ZDNet News: Technology News Now* (8 articles and a timeline, collected in "News Focus" at http://www.zdnet.com/sdnn/specialreport/0,12737,6021034,00.html) and *KVUE.com* ("Happy Birhday to personal computer" at http://www.kvue.com/click/425751__pc_birthday-sc.html). *The Publishing Business Group* offers an article by *PC Magazine* co-founder Cheryl Woodward on the explosive growth of that publication as linked to the success of IBM's first personal computer ("How We Started PC Magazine in 1981" at http://www.publishingbiz.com/html/article_pc_mag_startup.html).

[11] This ambivalence, marked by a communal desire on the part of the hobbyists to have Big Blue acknowledge that the little machine was worthy, and a fear that IBM's huge marketing force and dominance in the field would drown the garage-organization competition in its powerful wake, is documented in Freiberger and Swaine. This scenario had played itself out before, in the mainframe and mini-computer markets; the computer industry through the 1950s, 60s, and 70s was described as 'Snow White and the Seven Dwarfs,' with IBM as the pale heroine, and a shifting cast of smaller companies clustering dwarf-like around her capacious skirts.

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[12] The computer as an imaginary technology had, of course, been a staple of science fiction since that genre's similarly variously dated inception, which for the sake of argument I'll date contemporaneous to H. G. Wells' *The Time Machine* (the 'machines' tended by the Morlocks that allow for the ease and decadence of the Eloi serves the same double-edged function as does the supercomputer in much early science fiction). This imaginary history of the computer is the subject of Part I: "Legacy Systems."

[13] IBM's ad campaign featured an actor portraying Charlie Chaplin's Little Tramp character, gleefully toying with the computer. I will address this campaign at greater length in Part II: "Machine of the Year: The Computer Moves In."

[14] The date is approximate; *Neuromancer* was certainly published in 1984, but Gibson has always tried to distance himself from the cyberpunk label. Critic Rob Latham, though, pretty accurately sums up the layperson equation of the two in his formula "Cyberpunk = Gibson = *Neuromancer*" (266). Many self-described cyberpunks, by contrast, are eager to claim a much broader time frame and set of materials for their own (see, for example, Richard Kadrey's "Cyberpunk 101 Reading List"), but that 'expert' opinion is here less important to me than the general non-expert experience and impression of cyberpunk in the mid-1980s.

[15] In *Computer Lib/Dream Machines*, Ted Nelson describes the moniker Joe Turkey User as a Dartmouth College invention, meant to name an "estimable personage [who] knows hardly anything about computers, makes a lot of mistakes, thinks he understands what you tell him when he doesn't, tends to hit the wrong keys on the termanl, and in general tends to screw up" (*CL* 30).

[16] Obviously, this brief summary of Hennessy's text cannot do justice to the detailed nature of her critique of both theories of discourse and theories of the material, and her integration of these into a coherent feminist practice. To arrive at her articulation of a set of practices appropriate to the pursuit of a materialist feminism, Hennessy carefully reads the works of Michel Foucault, Julia Kristeva, Ernesto Lauclau and Chantal Mouffe for their varying usages of 'discourse,' noting the where the value of each theorist's paradigm breaks down. These readings are informed by Marxist and post-Marxist theories of ideology and hegemony, notably those of Althusser and Gramsci. In addition to this, Hennessy critically review trends in postmodern theory and various movements in academic feminism, among them standpoint theory and gender studies.

[17] The terminology here is Alluquère Rosanne Stone's. Stone offers the notion of 'materialized discursivity' to describe both the process of the textual construction of subjectivity and its effect of 'making real' those subjects: subjects are materialized and legitimated through a proliferation of documents that root them in particular places, times, and identities (*War of Desire and Technology* 39). Stone writes particularly of the construction of what she calls the fiduciary subject through such documents as birth certificates, phone book listings, bank cards, and the like, but this notion of the imbrication of text and perceived reality relates nicely to Hennessy's discourse-as-ideology and to my own contention that technologies, like subjectivities, can be built out of the very documents that encircle them.

[18] See McLuhan's *Understanding Media*, chapter 1.

[19] The 'rhetorical computer' I'm referencing here comes to be dismissively known in the 1990s as 'vaporware', or a much-vaunted, just-around-the-corner, wondrous machine, but one which is, at the point of writing, purely speculative. I use 'rhetorical computer' because I refer as much to vaporous hardware as to software, and the more common term is generally applied only to the latter type of wondrous product.

[20] I address this topic at greater length in a review of Routledge's introductory anthology *The Cybercultures Reader* (Morrison).

[21] The first school is exemplified by *Technology and Women's Voices*, edited by Cheris Kramarae, the second by Jean Baudrillard's *Simulations.*

[22] We could even co-opt this date into the current analysis, as the Altair is considered to have debuted at the moment of its appearance as the cover story in the January 1976 issue of *Popular Mechanics*—how to separate the narrated from the assembled when they appear together? Following the cover story, the Altair become the darling of hobbyists who willingly sent their $400 to Albuquerque, often not receiving their computers for more than 8 months afterwards. In that sense, the early days of the Altair are as imaginary as anything else.

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[23] That is not to say that the technological artifact is not embedded in a variously broad cultural context. Generally, it is. Nevertheless, the machine itself is conceived as being wholly a material thing. Here, I take a different view.

[24] I choose sexist language deliberately: despite obligatory references to Ada Lovelace (often characterized as Babbage's amanuensis rather than a mathematician in her own right) and to American Navy Admiral Grace Hopper (an early programmer of mainframes who wrote the first compiler), these histories are overwhelmingly masculinist.

[25] Said critics and theorists are Donna Haraway, Marshall McLuhan, Jean-François Lyotard, Neil Postman, Jean Baudrillard, and Alvin Toffler, respectively.

[26] More properly put, Lyotard argues that there was no such thing as 'raw data' to be 'processed' until there were computing machines to make this transformation of what was previously thought of as the artifacts of knowledge into the raw materials of information even thinkable. The postmodern condition is marked, in part, by this shift.

[27] The most privileged space of cyberculture is 'cyberspace.' Again, while cyberculture studies and its work on defining and analysing various cyberspaces are valuable to my reading of the personal computer, my understanding of 'technoculture,' the cultural condition of which this computer is a privileged emblem, differs enough from the many current articulations of cyberculture to bear further discussion.

[28] Norbert Wiener coined the term cybernetics in his book of that name in 1948. Hayles (*How We Became Posthuman*) and Porush (*The Soft Machine*) each address this at length.

[29] For a detailed description of the history of 'culture' and its variants, see Raymond Williams' *Keywords* entry (87-93).

[30] Although it may also be understood to designate studies of cyberspace particularly, or to denote that form of culture that may be discerned in on-line spaces, I prefer to promote a usage of 'cyberculture' that does not allow a conception of 'cyberspace' as something detached from any other kind of reality. I am not the first to manifest such scruples. Sociologist David Hakken warns: "there is good reason to withhold judgment about how ethnographically reliable the idea of cybersapce is" (3). If the social reality of cyberspace is just an extension into a new arena of the culture we are all already living, he continues, there is much to be lost by treating it as something new and different.

Often, this something-new-and-different is celebrated as the solution to heretofore intractable problems, the laundry list of social inequities that plague late 20th century culture. Kevin Robins calls this characterization of cyberspace as the new, happy, frontier of human possibility escapist and irresponsible: too many critics, in Robins' opinion, abandon the messiness of lived human relations at the end of the 20th century for the bodiless utopia of pure capital, pure information, purity generally of cyberspace. This is quite literally a flight from reality, and besides being insulting to those of us left in the real world, this vision of 'cyberculture' would seek to erase the material embeddedness of the new utopia in that real world critics seem so eager to escape from.

So for the moment, I will retain my broader definition of cyberculture, believing that on-line cultures don't get their own term until we've investigated their relations with culture-at-large. I prefer to call readings of on-line interaction 'cyberspace studies,' because it seems more appropriately descriptive.

Part I: Legacy Systems

Part I: Legacy Systems

The computer has a different history in fiction than it does in the practices and narratives of science, engineering, and work. Where those seemingly more objective discourses often arrive at conceptions of computerization through pragmatic concerns of literal computation—the crunching of larger and more complex data sets, and the increase of computational man-hours, measured much like horsepower—the fictional machine has a much more utopian and fantastical lineage. This lineage amounts to a literary 'legacy system' that influences later narratives about and characterizations of the 'computer' in ways largely distinct from changes in the practices and technologies of computation. 'Legacy system' is a term I adopt and adapt from computing science. It names a large-scale software or hardware infrastructure which, although outdated and no longer best-suited to the task at hand, continues nevertheless to form the foundation of an entire organization's computing and operational practices. More than a century's worth of accumulated writing about computers and computer-like machines in popular, genre, and high fiction asserts a similar influence on cultural apprehensions of the 'computer' throughout the twentieth century, and on the articulation of a new 'personal computer' in the 1980s.

The concept of the legacy system is as useful to literary history as it is to computing. The term aptly describes the importance and the staying-power of inherited narratives, as much as it names a certain class of inherited computer systems. Legacy systems are colloquially understood as "large software systems that we don't know how to cope with but that are vital to our organization" (Gold). They also tend to be old—sometimes decades old, absolutely ancient by computing standards: the *High-Tech Dictionary* thus defines a legacy system as "an information system that has been in use for a long time, usually on a mainframe or minicomputer" (ComputerUser.Com).[1] As such, their origins and documentation tend to be lost in the mists of time. There is another aspect of computing legacy systems which applies to their literary counterparts as well: legacy systems, owing to their centrality to the day-to-day operations they enable, tend to expand erratically and irrationally over time as the needs of their users change, prizing function over coherence. What is so often said of dissertations also applies to legacy systems: it doesn't need to be *good*, it needs to be *good enough*.[2] Literary and computing legacy systems are as messy as the ever-changing cultural and computational needs they serve. The *Free Online Dictionary of Computing*'s definition of 'legacy system' alludes to the general inelegance of its construction, usually comprising a hodge-podge of antiquated original programming and haphazard later kluges: according to this source, a legacy technology is "a computer system or application program which continues to be used because of the prohibitive cost of replacing or redesigning it and despite its poor competitiveness and compatibility with modern equivalents. The implication is that the system is large, monolithic and difficult to modify" (cited in Gold).

The legacy system, then, is a contradictory, complicated, over-large, irrationally constructed, unwieldy thing—and it is all of these things in proportion to its importance to a given procedure. I also want to stress that a legacy system is an *ad hoc* construction rather than a coherent, planned structure. Another hacker term might help us to understand this aspect of oft-amended legacy systems: a 'kluge' is the name given to the quick-fix variety of problem solving, and it certainly applies both to the computing context and to the literary legacy system I'm proposing here. Kluges, then, as opposed to hacks, are inelegant but operational program fixes.[3] For example, consider a program that tracked bank balances, service charges, interest payments, and the like, but had a bug that rendered it prone to complete breakdown in the event of negative balance, such as might be presented by an overdraft.[4] A kluge in this case might be to disallow all calculations on negative numbers. While such a strategy ensures that the original bug would cease to crash the program, a very important consideration for those running banks, it is hardly the ideal solution to the problem. Similarly, the literary legacy system that this chapter details does not describe the rational accretion of ever-more accurate representations of computing technologies in fiction, but rather notes various changes in practice and the sometimes radical shifts in characterization that are manifested in such fiction over time, and the manner in which these have been rendered operational via narrative 'kluging.'

The fictional computer's literary legacy system extends over a greater period of time than that represented by the incarnation of its mechanical counterpart. Computers—or, less anachronistically, 'computer-like machines'—have a long narrative history, predating by quite some time the widespread use of 'real' computers. Generally, the history of modern computing almost universally begins with the recounting of the construction and use of ENIAC in 1945.[5] Promoting a reconfigured literary history that organizes representative texts according to the function of the machines depicted therein, this chapter shows that the narrative deployment of both 'computers' and 'computer-like machines' has been a key element in fictional works that attempt to imagine new and different modes of being and doing for individuals and societies from at least the mid nineteenth century. Some critics liken this sense-making function to myth, a construction which once more emphasizes the symbolic rather than pragmatic utility of the machine. Daniel Ingersoll, following structuralist anthropologist Claude Lévi-Strauss, suggests that computer-objects are mythologized because in late twentieth-century culture, these objects are "good to think" in the same ways that for the tribal societies Lévi-Strauss studied, animals were 'good to think' (238). This quality of good-to-thinkness describes a given totem's utility to mythic operation. Lévi-Strauss describes the good-to-thinkness of animals, who, in myth "cease to be solely or principally creatures which are feared, admired or envied: their perceptible reality permits the embodiment of ideas and relations conceived by speculative thought on the basis of empirical observations" (qtd. in Ingersoll 239). And so the computer: modern, capitalist, Western culture, pervaded by machines of all sorts and increasingly by computing machines, takes these objects rather than animals as fodder for myth. Ingersoll describes this process of mythification and its ramifications:

> In everyday life, machines would be understood metonymically as actors, as extensions of men, put into action by men. To see them in the mythical imagination as metaphorical actors is to separate them and to give them a life of their own. Machines then become frightening symbolic projections of our own social and cultural being. (251)

Lynette Hunter, too, describes a "growing mythology of computing" that serves two purposes, as do all myths: it "describe[s] what people want as well as what they lack" (69). David Porush, in his book length study of cybernetic fiction, *The Soft Machine*, similarly describes fictional computers as operating metaphorically to similar purpose as Hunter's and Ingersoll's mythic computer. Porush is "convinced that the structures of our beliefs are founded on the metaphors we have chosen; that is, metaphors are the traces of our fundamental wishes and pretenses" (xi).[6]

The accumulated weight of these metaphorical representations amounts to an ideological ground upon or against which newer iterations of computer-like objects—mythic, metaphoric, *meaningful*—can be articulated. Hunter notes that the "mythology of computing … is intimately bound to the ideology of a western, mainly post-Renaissance, man-made world" and describes the spread of this mythology as promoted by "the existence of the anthropomorphized computer as the driving analogy for modern technology" (69). Likening this weight to a legacy system means acknowledging that the history of the shifting representations of these machines is driven by a powerful need to narrate computing machines in culture (in keeping with the noted essential-ness of the system in question) more than it is determined by a rational 'evolutionary' process. This weight is heavy enough that, writing in a 1991 textbook on the use of computing technologies in humanities research, Hunter sees fit to entitle her contribution "The Computer as Machine: Friend or Foe?" and begins by addressing the 'mythology of computers' as she understands this mythology, rather than any technical factor, to be a strong barrier to entry for would-be computing humanists. Considering the legacy system as socially constructed also entails taking into account the fact that, owing to the fictional computer's powerful role in the popular apprehension of the technologization of work, entertainment, and civic life, this system was prey to constant amendment—subject to kluges of varying degrees of elegance, meant to keep the system as current as possible, with little regard to notions of logical progress or evolution. That is, the legacy system does not hold within itself a progress narrative moving towards teleological perfection. The texts read in this current analysis are included here because they seem to present common or compelling kluges to the system of representation—I do not make arguments for or against the perceived 'worth' of these characterizations, nor attempt to discern 'growth' or 'improvement' in representation over time. Collecting and reading these texts is useful insofar as it establishes key representations—the 'artificial intelligence' run amok, the hubristic military computer, the bureaucratic nightmare made worse by machinery—some of which calcify into clichés that come indelibly to be associated with 'the computer' in ways detached from technical considerations. The resultant legacy system determines, over time, what comes to mind unbidden when the sign 'computer' is invoked in popular discourse. The 'personal computer' of the 1980s necessarily works through and against this canon, however much it sets itself up as a new and radical technology.

The Difference That Makes a Difference:

As useful as it may be to conceptualize the narrative history of the fictional computer in the terms offered by computing science and hacking—that is, by using terms like 'legacy system' and 'kluge' to propose an alternative literary history of computers-in-culture—it is important to recall that the mechanical computer and the imagined one are distinct.[7] In likening the fictional computer's diverse and accumulated representations to a legacy system, I offer a what I hope is a compelling metaphor; like all metaphors, it functions figuratively, to provide a helpful image with which to illustrate a point by analogy. In this case, the analogy suggests that the narrative inheritance informing the cultural understanding of 'computer' functions *like* a legacy system. I propose a *resemblance* between the literary history of 'computers' and an unwieldy type of software and hardware system, not an *identity* on the level of the reading of individual machines.[8] That is, I am not reading individual texts, or groups of texts, in search of strong similarity between 'real' computers and fictional ones. This distinction—between looking for computers analogous to physical contemporaries in fiction, and looking for 'computer-like machines' in fiction—is important. To seek the first is to implicitly assume identity between the engineered machine and the imagined one. Such a practice, I feel, greatly limits the readings we can make of the fictional computer, as it focuses the critical gaze on seeking relationships of verisimilitude and presupposes that the discursive legacy systems of 'real' computers and 'imaginary' ones are pegged. Of even greater danger is the assumed one-way relationship of influence, where the physical computer is held to be more 'real' than the fictional one, which, accordingly, is tacitly understood to attempt to reproduce this mechanism in narrative. A mimetic reading also takes for granted that the primary purpose of the fictional computer is to most 'accurately' ape the mechanical one. I do not think this is the case, or at least not wholly the case.

Conversely, if we instead seek out 'computer-like machines' in fiction that bear resemblance in either form or function to other such literary constructions rather than to physical artifacts, we are able to trace out a trajectory specific to imagined machines. It then becomes possible, in a way unimaginable when we assume that the textual representation of computing machines moves in lockstep with the engineering of these machines, to investigate the relationship of mutual influence between mechanical and imagined computers. The legacy system of computers in literature, in fact, moves much more in tandem with a wider and more general social engagement with technoculture as a political reality than it does with advances in engineering. This is the difference that makes a difference: a fairly simple shift in understanding, in which the histories and definition of engineered and imagined computers are uncoupled, allows us to understand fictional machines to have their own histories, their own timelines, their own narrative legacies. The fictional computer relates to, but is not identical with, the mechanical one. By discerning instead a narrative commonality among many different texts that depict computers and 'computer-like machines,' this chapter argues that the conception and representation of such machines begins much earlier than the appearance of mechanical computers, and that such representations shift according to public taste rather than engineering advances—according to cultural logic rather than the progress of science.

This distinction shapes the content and range of this chapter and underpins its purpose. Generally, the analysis of computers in fiction has sought not to apprehend what we can understand as the sign 'computer' but rather to identify and evaluate the relation of similitude between the mechanical computer and the narrative object 'computer.' For example, critic Patricia Warrick, writing the first monograph devoted to examining the computer in fiction, limits her study to texts produced since 1930. This date is chosen on the basis of some test of verisimilitude: in *The Cybernetic Imagination*, a "computer is defined as an automatic electronic machine for performing calculations and for storing and processing information" (xvi). According to Warrick, a literary machine matching this criterion first appears in fiction in a 1930 science fiction short story. Warrick's definition of 'computer' seems more appropriate to computing science than to literary criticism, emphasizing a literary construction's computational capacity and the nature of its physical components, rather than tracing its more narrative properties in the manner to which textual scholars are accustomed.[9] Warrick's study uncovers many of the texts that comprise the twentieth-century canon of computers-in-literature; in attempting to critically systematize and categorize these texts, Warrick performs essential groundwork in the field.[10] However, in paying such close attention to verisimilitude—to the point of organizing her assessments of the literary value of texts according to this criteria—Warrick misses the larger implications her investigation points to, or is incapable of fully addressing them in the framework of evaluative comparison she sets for her study.[11]

This gap is exemplified by the incapacity of the study's truncated timeline to fully explicate the material *The Cybernetic Imagination* investigates. Warrick herself chafes against the chronological constraints imposed by her definition of 'computer': as a result, despite trying to limit her analysis to 225 'cybernetic SF' texts written between 1930 and 1977 (xv), Warrick ultimately devotes two chapters to what she names 'antecedents' to the proper objects of her study. Writing of E. M. Forster's "The Machine Stops" (1909) and Yevgeny Zamiatin's *We* (1921), Warrick hits upon the insight that underpins the value of tracing out a more generous legacy system such as I propose:

> The machine that dominates the society [in these texts] is not a computer, but *it functions as a computer would.* The novel thus dramatizes powerfully the fears of machines and automation that haunt people today. It defines the humanistic values of individuality,

> freedom, and creativity, themes that recur repeatedly in modern antimachine science fiction. (48, italics added)

However, Forster's and Zamiatin's texts, along with Samuel Butler's *Erewhon*, must be laid aside as peripheral to 'real' engagements with comptuers in fiction, according to the definition of such machines and the evaluative criteria that Warrick establishes in her book.[12]

What kind of analysis becomes possible when we do not assume that computers in fiction are necessarily answerable to the limits imposed by 'real' computers? The removal of the criterion of similitude allows far greater latitude in the categorization of literary machines as computers, by evaluating these machines according to their narrative function ('functions as a computer would') rather than their resemblance to technologies the non-fictional world would name computers ('the machine … is not a computer'). I do not mean to suggest that manufactured computers are any more stable in their meanings than literary ones—they are prey to their own legacy systems of representation in addition to being constrained by technology's state of the art. 'Computer' too, can be troubled in the same way, as the delineation of this fictional legacy system will show. Unless I explicitly state otherwise, by 'computer' I always mean to indicate the sign 'computer,' composed like all signs of shifting signifiers and signifieds, with the purpose of discerning how this 'computer' is narratively constructed and ideologically useful in ways that change over time. 'Computer-like' machines, then, demonstrate the same ideological utility as do those narrative objects more recognizable as computers, without necessarily manifesting any overt resemblance to the physical machines now called 'computers.' Computer-like machines appearing in narratives describing the real, the desired, and the feared emblematize and embody anxieties about the relationship of human subject to technologically-mediated cultural forms: new kinds of jobs, or lack of jobs, surveillance, state control, scientific utopia, or totalitarian rationalism. I place under this rubric machines that predate what we now name computers, but which resemble in form, function, or aura those objects currently captured by that designation.

The conceptualization of 'computer' and 'computer-like machines' as shifting signs allows me to plausibly suggest that the appearance of narratively operational 'computers' in popular narrative long predates the engineering of the current manifestation of the physical machines we now hail by that name. I employ the term 'computer-like' not only to avoid legitimate charges of anachronism but to mark the concept of 'computer' *tout-court* as contested and shifting as well. The collection of a set of narratives that deploy computer-like machines to similar purpose will establish the narrative ground upon which subsequent representations are built. The standard of inclusion in this taxonomy is based on narrative function rather than identity with physical technologies, genre location, or medium of transmission. As a result, high-literary texts mix with pulp, and books mix with movies. Implicitly, for such a taxonomy to work, we will need to determine the narrative function served by the 'computer' in order to then discern the existence of 'computer-like' machines. What will link all these texts is not merely the appearance of certain kinds of machinery and a tendency to write about the future, but also the preoccupation with the rationalization of society, the powerful dramatization of the fear of machine dominance that Warrick diagnoses.

Legacy System: Building the Cultural Computer

In view of the well-recognized tendency of legacy systems to be complex, arcane, and difficult to understand in direct proportion to their importance to any given task, to understand how seeds of the new 'personal computer' of the 1980s are sown in that decade's popular imaginary, we will need to do some digging in old documentation: we must look backwards to identify the characteristics of 'computer' that the new machine must work through to attain coherence. As we might expect, the legacy system uncovered in such a project is a bit messy, somewhat complicated, and not completely knowable, comprising differing media, viewpoints, styles, and genres. As we might further expect, the represented computer of 1980s popular culture draws most explicitly on tropes of early- to mid-twentieth-century science-fiction to construct a revolutionary, utopian association. However, it also works through and against longstanding cultural ambivalence about technological hubris, an ambivalence which underpinned popular and literary writings on mechanization and industrialization beginning in the nineteenth century.[13] The 'personal computer' operates most immediately in the shadow cast by the cynical and exhausted representations of the late 1960s and 1970s, which generally pitted miserable, passionate, rebellious humans against eerily rational, large-scale machines of social control. This motif, which sets emblems of rationalization up against those of a glorious if irrational human history, an essentially unfathomable human nature, and the 'natural world,' repeats throughout the twentieth century, and is manifest in a broad range of texts beyond the generic boundaries of science fiction. It is this set of qualities—a concern, be it positive or negative, with mechanization; an engagement with the interaction between technology and human society; and, obviously, the representation of machines of various kinds—that distinguishes what I will group as legacy narratives of computing in this study. Likewise, a 'computer' or a 'computer-like machine' is an imagined object or practice appearing in such narratives, and embodying or enacting the concerns just named.

In the literary, genre, and filmic texts grouped here, that is, computer-like objects are bellwether technologies through which the technologization of society (hardly a process the existence of which was in dispute) was publicly broached. Collecting a number of these varied texts, written across a century that spans the 1870s through the 1970s, it is possible to discern moments of coherence, in which the narrative function and characterization of computer-like objects remains consistent across generic boundaries, or where one particular computer-image captures the mass imagination and fixes itself upon it, and can be seen to engage with the progressive establishment of the technoculture I identified in my introduction.[14] The legacy system offered here is anchored in the second half of the nineteenth century, although with a minor broadening of the criteria for inclusion, it would be possible to begin it much earlier.[15] Because I am primarily interested in the 'personal computer' of the 1980s as a particularly important emblem of technoculture, I will limit my taxonomy to texts dating from the industrial revolution of the nineteenth century and later, as it is from this moment that the current stage of technoculture begins to assert itself. In addition, the period at which I choose to begin my timeline is particularly rich in its literature, witnessing the birth of the genre of science fiction, and the re-orientation of classic utopian writing to reflect this emerging technoculture.

Victorian Ambivalence

If the texts of the 1970s would prove to be weary and cynical repetitions of a century's worth of writing, the 1870s were marked by great enthusiasm, invention, and creativity with regards to writing through and about mechanization and the emerging technoculture. New industrial technologies huffed and puffed, clanged and banged their way into the public imaginary, offering new images emblematizing the sweeping changes of the period. Pre-eminent among these emblems is the steam engine, the 'computer-like machine' of this period. Like the personal computers of the 1980s, steam-powered technologies defined both the work and the philosophy of their age. Herbert Sussman, in his *Victorians and the Machine: The Literary Response to Technology*, describes this dual import in his distinction between the tangible mechanization of Victorian life and the prevalence of mechanistic thought in the nineteenth century. 'Mechanization' speaks to the promulgation of material technologies; the term describes, for example, the process by which factories increasingly rely on machines to produce their goods (Sussman 6). 'Mechanistic,' on the other hand, describes a mode of thought that privileges the rational over the intuitive, the regular over the spontaneous, and the repetitiousness of the machine over the unpredictability of human action. Mechanistic thought uses the paradigm of regularity and order suggested by the machine to promote machine-like behaviour for individuals, or industrial-style organization of social institutions.

Mechanistic philosophy, as much as mechanization, was a productive force in literature: it is in response to sweeping industrialization as a visible material force that the final decades of the nineteenth century witnessed the birth of 'scientific romances' and science fiction, and a revitalization of the utopian genre. The industrial revolution, in addition to the economic and political changes it wrought upon the social landscape, also sparked a creative outpouring, in part by offering new images and symbols through which the literary imagination could process and understand the changes industrialization brought to lived culture. Obviously, science fiction and utopia, and the latter genre's offshoot 'anti-utopia' or 'dystopia' branches, are key generic locations for the representation of computer-like machines.[16] Sussman, though, discerns an enthusiasm for the imagery and philosophy of mechanization suffused throughout Victorian writing, from Charles Dickens to John Ruskin, Thomas Carlyle to Rudyard Kipling. He further indicates that literary apprehensions of the machine grapple with the central concerns of that age in two ways: first, deployed as metonymy for the idea of progress, "the machine, especially the railroad, was the most public, the most visual of emblems"; second, the mechanical rhythms and repetitions of the machine not only contribute to but describe the perceived decline of emotional vitality in Victorian life (Sussman 4).[17]

By the end of the nineteenth century, 'the machine' had become a literary shorthand for addressing both mechanization and mechanistic thought, a handy and evocative signifier one could deploy to name and to interrogate a transformed world. Sussman thus asserts that "only the literary symbol of the machine can express this complex interrelationship which defines Victorian life; for, as symbol, it eradicates the misleading antithesis of external technological change to internal emotional and intellectual change" (6). It is this centrality of the symbol of the machine, manifested in both positive and negative assessments of mechanization, that links represented Victorian technologies to later, more obviously computer-like ones.[18] Notably, Sussman's point addresses not the 'external technological change' the machine abets, nor even 'emotional and intellectual change,' but rather the machine's power as a cultural symbol via which such changes could be understood. In similar fashion, in his *Anticipations* (1902), H. G. Wells claimed that if it needed a symbol in the great chronological sweep of historical periods, surely the Victorian era would be understood as the railway age—because rail technology changed daily life so irrevocably.[19] Like Sussman, Wells picks up on both the symbolic and practical importance of the machine.

Late-Victorian Britain was the right place and the right time to be thinking and writing about machines and progress. Considering the dramatic changes in the visual landscape, the nature and speed of travel, and the processes of work occuring in the nineteenth century, it is hardly surprising that writers of that era struck upon the machine as a powerful literary symbol of the new realities, and that this symbol came to pervade texts across many genres. However, much earlier texts are essential to the discursive history of technoculture, articulating the 'scientific world view' philosophy which undergirds the rationalization of society, as in Francis Bacon's *New Atlantis* (1626), which offers its readers positive and vivid fantasies of the wonders obtainable by mechanical invention—and demonstrates that an idea that comes to be canonical, can, in the 'wrong place' and 'wrong time' go completely unremarked. Utopian literature like Bacon's stands most obviously as a precursor to the 'wondrous machine' stories we are here seeking; certainly, the 'good place' described by Bacon is narratively founded and grounded in various enabling 'high' technologies, brought about by a scientific élite, that allow for the transcendence of the current in favour of the better. In this vein, Walter Fogg asserts that Bacon "is the prime example of a utopian who firmly believed that the practical application of the new science and technology meant the progress of mankind" (62).

Bacon's utopia, though, is anomalous, standing in stark contrast to the other utopias of the seventeenth century; Krishan Kumar notes that "the dynamic scientific society was implicit in Bacon's *New Atlantis*. But the utopian writers of the seventeenth and eighteenth centuries were not on the whole interested in growth and expansion" (35). That is, *New Atlantis* was the right text in the wrong time—like Gregor Mendel's genetics research, Bacon's ideal society did not fall 'within the true' of his time. Rather than leading the pack, Bacon's utopia appeared and disappeared, languishing mostly unread until the nineteenth century: his rational, progress-based utopia simply did not capture the imagination of his contemporaries.[20] The genre itself had to change before *New Atlantis* rose from obscurity again. And change it did: according to Kumar, "the decline of the literary utopia, and the rise of utopianism in a new historical and 'scientific' form, marks an important change in the consciousness of European societies" (33).[21] As Fogg notes, "what was 'utopian' for Francis Bacon in the seventeenth century was nearly a fact of life by the nineteenth century" (63). The movement from a view of perfection as stable and unchanging to a belief in the desirability of constant improvement was marred by definitional confusion—between science and technology, and between mechanization and mechanistic thought—that manifested itself, in part, in ambivalent and sometimes internally contradictory portrayals of the machine.

Roslynn Haynes suggests that Victorians were hampered by a problematic collapsing of difference between 'science' and 'technology.' In her study of H. G. Wells, Haynes opens her discussion by distinguishing between these two concepts. Science, she writes, promotes "an advancement in the understanding of the way in which the world functions" without necessarily carrying attendant increases in control over nature or concrete social utility (69). Technology, on the other hand, "does not significantly add to one's understanding of the laws of nature, but it does increase the possibility of control over one's surroundings" (69). Vivian Sobchack offers a similar reading of this relationship, arguing that "[s]cience ... attacks the problem of man's fear of the uncontrollable by practically controlling what it can through technology. Science is a system of belief, technology a mode of action whose purpose is to overcome man's physical inadequacies" (62). Generally, the mass of nineteenth-century writing "showed an overwhelming confusion of science with technology and a painful ambivalence toward both" (Haynes 69). Sussman, too, writes of the characteristic ambivalence of nineteenth-century takes on the advancing technologization of industry and daily life, noting that "in confronting machine technology, the Victorians did hold directly contradictory ideas. The machine is both the unwearied iron servant and the sacrificial god to whom mankind has offered its soul" (7).[22]

Samuel Butler's *Erewhon* (1872) is a wide-ranging satire that follows the Swiftian practice of using the device of an 'ideal society' in an undiscovered country to recast his own society as an object of ridicule. The novel features a two-chapter diatribe that seems to promote machine-breaking as a viable means to address the concern that humanity was well on the way to extinguishing itself in the service of helping machines to 'evolve' into sentience and dominance. *Erewhon*'s protagonist, explorer and colonialist Higgs, discovers a closed society where all the cherished values of his own Victorian England are reversed. The reversal extends to the name of this topsy-turvy undiscovered country: 'Erewhon' is, obviously, a near-reversal of 'nowhere' or utopia. Throughout his stay in Erewhon, unsurprisingly, Higgs relates

Erewhonian cultural mores that seem perverse inversions of Victorian British practices, for example in the Erewhonian practice of punishing the sick and curing the criminal, and their insistence on training future professionals at 'colleges of unreason.' In addition to these standard targets of social satire—the justice, medical, and education systems—*Erewhon* also engages industrial technologies, seemingly using Darwinian concepts of evolution to work through the nature and tendency of mechanization on human society. Put on trial for owning a mechanical watch, Higgs learns that the Erewhonians maintain a sort of technological stasis, having destroyed all their own machines and banned the invention or importation of any new ones.[23] The reasoning behind this practice is explained across two chapters entitled "The Book of the Machines." Claiming to transcribe from memory the original tract that called for the breaking of the machines, narrator Higgs relates the Erewhonian view of an analogous relationship between machine and human evolution. In a not too distant future, warns the Erewhonian philosopher, human beings would become a race of slaves to the needs of superior machines of which they were once masters.

The tract—'reprinted' in the novel 'verbatim' as "The Book of the Machines"—suggests that if the histories of machines and humanity are considered together, it is clear that machines are quickly outstripping humankind in the pace of their development, undergoing a shockingly efficient and rapid evolution: any race for survival of the fittest would seem increasingly weighted in favour of machines. Blending a pop-Darwinian view of an essentially amoral universe with the observation that machines seem more fit than humans for longterm survival, the passage strikes a chord undiluted by the estranging effects Butler uses elsewhere in the novel. Unlike the silly and clearly laughable device of the 'Musical Bank' that Butler employs to lampoon the hypocrisy of Victorian church-going and the attendant masking of convention as the true social power, in the 'The Book of the Machines' machines and mechanization are not at all estranged or disguised or ridiculed. The power of the Erewhonian philosopher's compelling rhetoric on the subject—whether meant to be ridiculous or no—thus hits the reader directly. The tract-writer, a professor in the 'College of Unreason,' quite reasonably links the elegant efficiency and heartlessness of the machines to the degradation and blind servitude of the instrumental men who feed them, asking:

> How many men at this hour are living in a state of bondage to the machines? How many spend their whole lives, from the cradle to the grave, in tending them night and day? Is it not plain that the machines are gaining ground upon us, when we reflect on the increasing number of those who are bound down to them as slaves, and of those who devote their whole souls to the advancement of the mechanical kingdom? (208)

This passage might just as well appear in a political speech contemporary to the novel's publication: it evokes no science-fiction fantasy, but rather describes the Victorian factory. However, in contrast to their English brethren, the Erewhonians universally agree that the machine evolution must be stopped, and, further, that many of the machines they already have must be destroyed. The passage is not without comedy, though, and the machine-breakers suffer the slinging of satiric arrows from Butler: the philosopher muses at length on the emotional lives of potatoes, the relative consciousness of the silent-suffering oyster, and other questionable logical leaps that narrator Higgs complains himself unequal to understanding, let alone translating. The insight of machine consciousness itself is sparked by a suspect analogy between human evolution and the development of machines.

Regardless, if the satiric intent of the "Book of the Machines" chapters is to demonstrate, as Thomas Remington suggests, that specious analogy and Darwinist analysis ought never to proceed together, the satire may indeed fail. If readers can easily see the folly in comparing a potato's drive toward the light to human consciousness, it is not at all certain that Victorian audiences would find it foolish to suggest that machines might evolve to self-awareness and consequently supercede human culture. Indeed, the satire in these chapters does not seem to mock the decision to de-mechanize, but instead derides the bureaucratic means by which the Erewhonians decide where to draw the line on their machine-breaking: the Erewhonians quibble over what degree of mechanization is essential to the maintenance of their quality of life, and of course certain lobby groups demonstrate pecuniary interest in saving a particular technology from banishment, by means of obviously spurious logic. Also, Higgs relates the hypocrisy of the machine breakers, who develop new (mechanical) weapons to enforce their no-machine policy. Ultimately, though, most machines are destroyed, and the Erewhonians seem none the worse for it—except that they are an illogical race of godless people that Higgs plans to enslave.

Erewhon lampoons many aspects of high-Victorian society, but this extended musing on the nature of contemporary high technology, mechanical and industrial, presents a tone of seriousness and ambivalence not to be found elsewhere in the novel. The imagery is disquieting not merely because, as Remington notes, in hindsight twentieth-century readers and critics see the concerns expressed in "The Book of Unreason" as both prescient and current. It is disquieting because it speaks to Victorians' as well as our own worst fears about mechanization in both practical terms and fantastic ones: there *is* something dehumanizing in having one's entire work life, the whole economy, oriented toward the tending and improving of machines; it *is* frightening to imagine that, in light of their importance to the comforts and structures of daily life, loss of the machines might incapacitate humanity; it is terrifying to consider whether the success of machines might lead to a form of consciousness in them.[24] While more sober reflection may convince Butler's nineteenth-century readers that the latte concerns were somewhat removed from the realm of plausibility, this check on hysteria does not apply to the first concern, which accurately describes the reliance on technology of Victorian factory labour and production techniques. There is nothing in Butler's derision of false analogy that can allay this fear, and for this reason, his writing on machines remains ambiguous as well as ambivalent. Butler's satire is broad, and *Erewhon*'s 'The Book of the Machines' uses popular imagery of machines and mechanization to attack 'unreason' in argument, folly in bureaucracy, hypocrisy in war, and greed in politics. Although a potent narrative agent (and perhaps in ways unintended in this case), the machine for Butler is really only a useful symbol by which to address those above-named issues peripheral to it. By the end of the century, though, machines and the scientific apparatus and mindset which constructs them were established as generic staples in a body of fictional works devoted primarily to these very topics. This body of text, of course, has come to be known as science fiction; its birth is generally dated contemporaneously with the writing of H. G. Wells, often referred to as the 'father' of the genre.[25]

Modernist Machines: The Dynamo

If the steam engine and the railroad train came to symbolize the Victorian age of high industrialization, the emblematic technology of the modernist period is the electrical dynamo, a meta-machine, in a sense, that generates pure power—not mechanical power, as the steam-driven engine of the nineteenth-century, but invisible electrical power that in turn drove more specific machines in their physical operations.[26] As the representative technologies of the modern age 'dematerialize' in this manner, they become less tied to one specific purpose, and thus lend themselves to wider and wilder kinds of speculation about the uses to which they might be put. It was also less clear what the dynamo itself did: its 'product,' electricity, was invisible to the human eye and dangerous to the human body. The dynamo was a technology that powered other technologies; it was a machine that served machines, and was a powerful symbol of human control over power and nature. It pervades the creative landscape of the early twentieth century. The dynamo functions as both symbol of modern life and its central technology in Eugene O'Neill's *Dynamo* (1929). In this play, tortured youth Reuben Light resolves a whole soup of familial, religious, and sexual dilemmas by devoting himself to a religion based around the worship of a feminized electrical dynamo—in the play's final scene, Reuben suicidally consummates his passion for technology by completing the machine's circuit with his body, grief stricken at the loss of his faith in God, in his God-substitute the dynamo, at the death of his mother and at his murder of his lover. He terrorizes his minister father, taunting him with idolatrous blasphemy: "Your Satan is dead. We electrocuted him along with your God. Electricity is God now. And we've got to learn to know God, haven't we? … Did you ever watch dynamos? Come down to the plant and I'll convert you!" (II.i). Reuben, driven to madness by his grief and frustrations, has substituted the idol of the dynamo for his absent religion, his lost mother, and even his lover—religious feeling, maternal affection, and sexual love are subsumed into a blind worship of the machine. But it cannot satisfy him. He wails to the machine, "Mother! Don't you hear me? Can't you give me some sign? O Dynamo, who gives life to things, hear my prayer! Grant me the miracle of your love!" (III.i). Clearly, in *Dynamo*, the titular machine does more than simply generate electricity: it is the lightning rod drawing toward it all the powerful anxieties of a culture in crisis.

The themes expressed in O'Neill's play recur throughout the the visual arts and the emerging genres of popular film. Visually remarkable, the dynamo is an awesome emblem of the cultural change it provoked and announced. Fredric Jameson describes the modernist period as prey to "the exhilaration of futurism" ("Cultural Logic" 36), an "excitement of machinery" that manifests itself in "mimetic idolatry" (37), clearly discernible here in the actions of O'Neill's protagonist. According to David Porush, the mimetic idolatry that Jameson identifies in thematic representations of technologies applies to formal qualities as well: "literature is as much a product of the technological and scientific milieu as it is of the artistic one. Some of the large ideas, call them theories or metaphors ... alter the way work is done in art" (Porush x). The ascendance of the dynamo as symbol coincides with the period of high modernism in the visual arts, and Bruce Grenville describes the import of the machine to a particularly modernist visual aesthetic: cubism in French painting, the Italian Futurist movement, and German Expressionism in cinema, for example. Grenville concludes that "[t]here can be no doubt that the machine as a powerful presence has not only shaped the socio-economic formation of the modern world but also acted as a cipher for larger cultural debates on the nature of being" (13). Grenville curated a recent travelling exhibit, *The Uncanny: Experiments in Cyborg Culture,* which documents the vast spread of images of machines and the use and critique of industrial technique that pervaded artistic production in the earlier twentieth century: British expatriate turned American film entrepreneur Eadweard Muybridge's scientific-styled serial photography that reduced fluid motion to numbered progressions; French painter Fernand Léger's bright, flat, cubist paintings of workers, machines, and industrial processes; Marcel Duchamp's 'readymades' that re-placed mass-produced consumer objects as works of art; the aesthetic of *Metropolis*; and the studied use of sound and of industrial setting in *Modern Times*.

Thematically, the dynamo is worshipped (or feared) for its abstract power, its beauty as machine, its perfect rationality of operation. In Fritz Lang's 1927 film *Metropolis*, it is mass industrial process rather than a particular machine technology that produces the effect of awe and provides the template for the organization of society: famously, in its opening scenes, the core of the future-city is shown to be run by wondrous machines and a sub-class of 'hands' only nominally human, who move in unison like clockwork. Workers are part of the machine, un-individuated, subsumed into the larger mechanism. Charlie Chaplin's *Modern Times* (1936), by contrast, sees the Everyman tramp fed through a massive machine to emerge as a comic, confused human/machine hybrid mechanically wrenching his arms to thoughtlessly tighten any bolts he happens upon: his is an individual story of subjection to the machine. The *Uncanny* exhibit ran a repeating loop of the scene of the Little Tramp being wound through the machine; in a catalogue essay, Grenville writes that "*Modern Times* is a cautionary tale about the dangers of the industrial age and the powerful machines that threaten, quite literally, to consume the worker … [who] must maintain the machine according to its needs and schedule" (26). This sequence occurs early in a film that interrogates the incursions of many technologies into culture, including the technology of synchronized motion picture sound: this was Chaplin's first 'talkie.'[27] Grenville sets this representation of the factory worker against the photographs of Lewis Hine (who, all the while claiming to take photographs of scientific realist value, nevertheless produced stunning and beautifully composed images of workers and machines) and the early paintings of Fernard Léger (whose painting technique, paired with heroic depictions such as of the machine-opeator in *Le mécanicien* [1920], tended to celebrate the machine): Chaplin's construction is much more negative, displaying much greater fear of the role of the machine in production—as befits a film auteur with an uneasy relation to his own productive technologies.

In his autobiographical essay "The Dynamo and The Virgin" (1907), Henry Adams takes a more cerebral tack, and ponders the parallel mystical effects produced by contemplating, by turns, the Virgin Mary at Chartres Cathedral and the electric dynamo at the World's Fair in Paris. Adams's short essay fastidiously recounts its author's ostensible incapacity to comprehend the machine's operations—and his complete enthrallment to it as symbol of modernity, of power, and of awe. Joseph Tabbi claims that "[i]n the unceasing craftedness of Adams's sentences, their simultaneous detachment from and immersion in American matter, their embrace of contradiction and self-consciously literary reflexings, we approach a properly complex relation between technology and the imagination" (23). This relationship exists in tension between use value and symbolic value. In "The Dynamo and the Virgin," Adams's 'craftedness' takes the form of the careful construction of a narrative persona whose naïveté the author wishes to highlight, if he cannot share it. Adams deploys third person narration to describe the fictional 'Adams''s ignorance in the context of the authorial Adams's knowledge. The protagonist's lack of knowledge is a device that allows the author to clearly describe the dynamo's primary function as symbol of a modernity seemingly otherwise inexplicable to hapless humanists. Adams-the-character is set face to face agains the wonders of the World's Fair in Paris. He happens upon the dynamo. Unable to logically apprehend it, his "historical neck broken by the sudden irruption of forces totally new" (382), that is, by the vision of the dynamo,

> [t]he historian was thus reduced to his last resources. Clearly if he was bound to reduce all these forces to a common value, this common value could have no measure but that of their attraction on his own mind. He must treat them as they had been felt; as … attractions on thought … [H]e would risk translating rays into faith. (383)

Adams variously describes the dynamo as an "occult mechanism" (381), and as "a moral force" (380). Such reactions are opposed to those of his expert guide, Langley: "[t]o him, the dynamo itself was but an ingenious channel for conveying somewhere the heat latent in a few tons of poor coal hidden in a dirty engine-house carefully kept out of sight; but to Adams the dynamo became a symbol of infinity" (380).

From this passage, it is clear that Adams the writer—if not 'Adams' the character—is well aware of the prosaic function and operation of the dynamo;

nevertheless, the contrast between the physical and symbolic work of the machine is stressed. Recall that Adams-the-author narrates Langley's interior reality as well as protagonist Adams's. Adams-the-author, then, deliberately chooses to suggest that the true power of the dynamo lies in its symbolic function. Like the Virgin at Chartres, the dynamo strikes awe in those who behold it: it connotes a power more fundamental than the generation of electricity; it defies reason. In Tabbi's estimation (conflating author and narrator), "Adams's self-consciousness reveals the specific situation of an early modernist writer who finds himself separated from the dominant energies of his age, and who must live in an ever more secular culture amid technological forces and emerging corporate systems too complex for any single mind or imagination to know or experience directly" (2). Concentrating on the (constructed) helpless historian's need to understand modernity on the emblem of the dynamo, Adams (the author) demonstrates the machine's capacity to give a physical presence to otherwise incomprehensible social forces seemingly out of all scale to human understanding. For Tabbi, Adams's bind is historical, and his dumbfoundedness in the face of the Fair's modernity is broached via an experience of the sublimity of its icons (2).

"The Dynamo and the Virgin" offers an unusually clear demonstration of the exemplary and symbolic function of high technology in the early twentieth century, and of the electrical dynamo in particular. This signifying function, of course, is not cut from whole cloth—it calls into play existing religious iconography, whereby Adams and O'Neil imbue the machine with mythic significance; gendered representation, as of the uncanny robot Maria in *Metropolis*, and again of the re/productive dynamos of Adams and O'Neil (Grenville 22, Tabbi 4); a modernist prizing of technique and originality demonstrated in avant-garde painting and new photographic processes (Grenville *passim.*, Bolter and Grusin chapter 1 *passim.*); and an overall aestheticizing impulse. Nor is the dynamo distinct from the cultures in which it operates: it is a productive force in the processes it symbolizes. For Adams, the figure of the dynamo allows his historian-protagonist to broach the secularization of culture. For Chaplin, the machine's controlling influence on the Little Tramp prefigures a later and similar reading of fascism and totalitarianism (Grenville 26).

For O'Neill, the assorted ills and tensions of the American early twentieth century issue through a consideration of the dynamo, in a manner similar to disorganized light broken into its components and and refocussed through a prism. In all these texts, the wondrous machines of the modern era are prized not so much for their practical effects as for the world-views they engender, the metaphors they inspire, and the techniques and aesthetics they propose: the machine is exemplary, it is awesome, it indexes modernity and power, and it concentrates the debates of shifting modes of production and political organization onto itself as symbol and provides an iconography for it.

Enter the Computer

The 1950s and early 1960s saw the spread of actual computing machines, and the idea of large-scale information processing, throughout industry. The scale of this spread shouldn't be exaggerated, of course: remember that this is the period in which IBM founder and president Thomas Watson Sr. said he didn't imagine a world market for computers ever exceeding, say, *five*. Jay David Bolter and Richard Grusin, accordingly, downplay the importance of the computer as a medium in this period, claiming that "[a]s long as computers remained expensive and rare, available only to a limited group of experts in large institutions" their wider cultural effects would be limited (66). Nevertheless, the new computing machine retained the strong symbolic function of the steam engine and the dynamo, and concentrated this function onto a new iconic form: the 'electronic brain.' As the marvels of ENIAC and the Harvard Mark 1, and then of the commercial UNIVAC machine, were spread by the popular press, Western popular culture was wowed by this stunning convergence of science fiction with science fact. The gee-whiz reactions, though, were tempered by the same anxieties that had attended earlier machines. As Andrea Slane suggests, "[a]s computers became an everyday reality in the shadows of the atomic age, they entered into a very tangible tangle of faith and fear about the power of rationality to govern human life" (73). To this tangle was added a new twist: if the dynamo replaced hands, the computer appeared potentially able to replace *brains*. Bruce Grenville notes of the early twentieth-centry machine landscape that "its most profound impact was on the lives of the working class who utilized and serviced those machines in the factory, and not on the lives of the middle and upper classes" who indeed "tangibly benefited" from improved standard of living (17). Now, though, computing machines moved from the shop floor to the front office, trailing legacy anxieties and provoking new ones as well.

In "As We May Think," published in *Atlantic Monthly* in July 1945, Vannevar Bush began to imagine a reorientation of war-driven technology-development toward civilian uses: the technologized office of the increasingly harried knowledge worker. A high-ranking science official in the American war effort, Bush describes his military scientific endeavours as "exhilarating." In July of 1945, though, he finds himself in a position to be asking, "[w]hat are the scientists to do next?" (intro). He outlines the many accomplishments of science, the increase in material comfort as well as intellectual reach that its work provides. The problem seems to be one of too-great success: "The summation of human experience is being expanded at a prodigious rate, and the means we use for threading through the consequent maze to the momentarily important item is the same as was used in the days of square-rigged ships" (section 1). The next several sections of the essay detail the many (coming) advances in knowledge storage and dissemination. Bush retells the stories of Liebnitz and Babbage, whose societies and manufacturing infrastructures proved unequal to the task of producing their calculating machines. By contrast, efficient and modern post-war American industry sets the stage for real blue-sky innovation: "The world has arrived at an age of cheap complex devices of great reliability," Bush asserts, "and something is bound to come of it" (section 1).

For Bush, this 'something' entails the mechanization of inessential or routinized thought processes, which he understands to comprise everything from listmaking to complicated logical operations to higher mathematics. Impatient with the incapacity of the scientist to keep abreast of the public record, Bush proposes rationalizing the intellectual landscape: he writes, "For mature thought there is no mechanical substitute. But creative thought and essentially repetitive thought are very different things. For the latter there are, and may be, powerful mechanical aids" (section 3). The mechanical aid he describes sounds much like a computer:

> The advanced arithmetical machines of the future will be electrical in nature, and they will perform at 100 times present speeds, or more.
>
> Moreover, they will be far more versatile than present commercial machines, so that they may readily be adapted for a wide variety of operations. They will be controlled by a control card or film, they will select their own data and manipulate it in accordance with the instructions thus inserted, they will perform complex arithmetical computations at exceedingly high speeds, and they will record results in such form as to be readily available for distribution or for later further manipulation. Such machines will have enormous appetites. One of them will take instructions and data from a whole roomful of girls armed with simple key board punches, and will deliver sheets of computed results every few minutes. There will always be plenty of things to compute in the detailed affairs of millions of people doing complicated things. (section 3)

This description demonstrates the classed and gendered underpinnings of the new, post-war, technological utopia. Bush's hypothetical machine, supporting the work of "people doing complicated things," is of very specific and limited use: extending the intellects of the managerial/knowledge classes, superceding the need for imperfect, feminized clerical aid, here transmuted into a "whole roomful of girls" now supporting the knowledge effort instead of the war effort. Mere paper-pushers everywhere had right to fear for their livelihoods in this brave new world. Bush describes the freedom thus gained for the harried scientist: "One can now picture a future investigator in his laboratory. His hands are free, and he is not anchored" (section 3). Taking pictures as he goes, dictating to himself, the scientist's thoughts can now move unmediated from the idea to the record, his labours becoming properly, purely intellectual.

Bush found his current state of affairs unbearably error-prone, slow, irrational. He wonders why a sort of machine-age Esperanto can't be devised, to offer a form of speech the machine can understand; why numeracy is based on Arabic numerals when punched cards are so much more practical; and why the indexing of records is an institutional rather than individual process. He seems especially concerned with the presence and the activities of female clerical workers, describing particularly the uncanny and disturbing vision of the female stenotype operator with her blank stare, immobile body, and rapidly moving hands. At a stenography demonstration, he relates, "a girl strokes [the machine's] keys languidly and looks about the room and sometimes at the speaker with a disquieting gaze," creating a code only a select few can understand, which needs to be further mediated—translated—before it is legible to those into whose hands the record is ultimately destined to land (section 3). If you can believe it, one paragraph higher, a different girl "strokes" the keys of a different machine, provoking it to speak.[28] Ultimately, Bush's vision, proposing a 'Memex' machine to free up the creative mental processes of knowledge workers by mechanizing routine information storage and retrieval, bespeaks an early utopianism with respect to civilian computing. For this, Bush has been named by many as the 'father of hypertext.' Certainly, "As We May Think" does outline a potential solution to the burgeoning problem of what we would now term 'infoglut.' But the article also manifests a host of concerns, for which various kinds of automation and computation are proposed as solutions.

The computer was clearly moving from military application to commercial use: gigantic, expensive, and finicky, and also requiring a horde of male experts to tend it and female workers to operate it, this physical machine awed the general populace—and scared them with the spectre of an artificial intelligence that might supercede human intelligence. The computerization and consequent feared depopulation of the workplace—white- and pink-, as well as blue-collared—is a common theme in the less fantastical narratives of this period, authored by less powerful personages than Bush. The utopian vision of the storied scientist and the dystopian fears of the general public were distinguished only by their different positions on the technological food chain. In this vein, when *Time* magazine ran a cover story entitled "The Computer In Society" on April 2, 1965, featuring an ominous graphic of an anthropomorphized mainframe computer towering over assembled office workers, the message it sent was mixed. The machine has six hinged, skeletal arms; its 'eyes' are reel-to-reel tape heads; it 'feeds' itself punch cards; it 'writes' at a teletype machine which spews reams of flowing paper to cover breathless exectives eagerly reading it. A buxom woman presents the massive computer with an offering of punch cards on a platter raised above her head. Behind the machine hovers a quite literal "giant brain," attached to the computer by electrical cables, dominating the upper third of the composition. The image is uncanny and scary, and yet six of the seven human subjects in the frame are smiling: their collective posture and scale suggest servitude and diminished status, but their facial expressions connote happiness.

The cover, then, presents an ambivalent scene, a mismatch between representation and interpretation: it looks really bad, but everyone seems happy. This disjuncture is partially resolved by careful gendering of the human subjects in the image and their positioning along an input-output continuum that maintains standard hierarchies and minimizes the machine's threat to established systems of knowledge and power. Slane suggests that "[o]ften, this conflict of rational and irrational thought was staged as a gender conflict" (73)—and, I would add, as a classed battle as well, as the *Time* cover demonstrates. Of the seven depicted office workers, only one is female: she is also the only one is a position of incontrovertible, obvious subservience to the machine, offering the stacks of input—the raw material—to be computed. Her posture, with arms upraised and face hidden from the machine's view, recalls tribal sacrifices to the idol, or indeed *Dynamo*'s blasphemous Reuben Light worshipping at the altar of electricity, and marks this subject as of a lower order than the false god she serves. Five men engage with the output; outfitted in suits and ties, they are clearly of the managerial class. These knowledge workers toil to extract meaning from the reams of paper disgorged by the machine. They're all pointing and smiling, which seems to indicate that the output pleases them, that it is comprehensible and meaningful. This role as interpreters—as makers of meaning—is reinforced in the figure of the seventh man, who is moving into the image with a computer-printed flowchart held aloft. He appears to be addressing the computer; his facial expression connotes the displeased boss demanding that work be redone. Thus the real power appears to continue to inhere in human agents in traditional roles of authority. From the attitudes and positions of the human subjects in this composition we can infer the following: the jobs of managerial-class workers are not threatened by computerization; the power of these managers as knowledge workers will not be diminished; and, finally, while female clerical workers may be fewer in number, their role will remain much the same, tending to machine as well as human 'bosses.' Not only does the 'giant brain' fit into the workplace, it does not destabilize the relationships of the human figures to one another. The giant-brain computer here seems to be integrated into the existing white-collar workplace hierarchy: it is located *above* secretaries, but *below* executives and managers, a configuration remarkably similar to Bush's vision—a configuration likely to reassure *Time*'s readers.

Popular, general-audience fictional treatments of the computer proliferate after the second world war as well; like the *Time* magazine cover, they too deploy gendering to integrate large computers into established work *milieux*, thus again minimizing the threat to the male managerial classes. The gendering of the computer as female provides, according to Valerie Broege, "an effective way to decrease our discomfort when facing an alien threat" (184). Indeed, feminized computing machines "are treated as subordinate to human males, often in a patronizing way" in practices "reminiscent of the stereotyped relationship of a boss and his female secretary (Broege 185).[29] 1957's *Desk Set*, a Hollywood romantic comedy featuring Spencer Tracy and Katharine Hepburn, narrates the computerization of a television network's research and fact-checking department: tellingly, the research department consists of single, attractive women, the "roomful of girls" that Bush describes as holding the key to information access. The jobs of the feminized research workers are threatened by a similarly feminized mainframe, the 'EMERAC' referred to in the third person feminine and nicknamed 'Emmy,' or sometimes 'Emily Emerac.' To establish this feminine gendering further, the machine is primarily operated by a female attendant, the shrewish Miss Warriner. Andrea Slane marks this type of gendered representation as endemic: "[t]he history of the depiction of computers in narrative films centrally reflects (or helps construct) the imaginary place of computers in American visions of power, individual freedom, and democracy—concepts which, despite their appeal to universal humanism, continue to be gendered in substantial ways" (72).[30] In the film, both the computers and the jobs they threaten are feminized, creating a nice safe distance from the repercussions attendant upon the development of a computer that might be on a par with Man—that is, with *men*.

The computerization of the workplace in *Desk Set* has the twin effects of reassuring the male managerial classes that their jobs are secure, and of rationalizing and disciplining the previously gossip-driven and informal female workspace. In any case, this newly-disciplined and now appropriate human femininity trumps feminized machinery: a computerized research department cannot read between the lines of requests, cannot finesse callers or add 'that special something' (i.e., a woman's touch) to the work. Even the quasi-feminine, machinic Miss Warriner is incapable of such work, literally breaking down in tandem with the machine: as it bleeps and whirrs out of control, she tears her hair and shrieks, finally running from the room in a hysterical fit seemingly more appropriate to the Victorian age than to the cosmopolitan, modern setting of the film. The machine's (and the machine operator's) incompleteness is further and ultimately demonstrated in the substitution in the hero's affections of the human, fully feminine, researcher for the machine. Indeed, for the film's release in Britain, *Desk Set* was aptly retitled *His Other Woman* (IMDB). Tracy's Richard Sumner is the computer company's representative and Hepburn's Bunny Watson head of the research department and as such they must and do fall in love: this love conquers the threat of unemployment and the computerization of intellectual labour, as it turns out that the computer needs its human tenders—in the climactic marriage proposal scene of the film, Emmy proves unable to provide the correct, that is to say, affirmative, answer to the question "should Bunny Watson marry Richard Sumner."[31] The incursion of the machine into Watson's workplace—also her primary social arena—checks the excesses of this feminized locale. But not too much: interaction with the machine should leave desirable femininity intact. The computer-age femininity of technician Miss Warriner is hardly any better a draw on Sumner's affections than is the EMERAC itself: primly buttoned and tightly bunned, devoid of the markers of attractive femininity, she too has eyes only for the machine, and indeed resembles one in her rationality, her literalness.

Early portions in the film see a rampant interoffice gossip network, with split-screen film effects showing the rapidity of the spread of company information through idiosyncratic and feminine uses of the telephone.[32] Hired by the network as an "efficiency expert" or "methods engineer," Sumner is initially ordered to keep his purpose—the computerization of the research department—a secret from that department's employees. Male reticence is no match for the female networks in this workplace, and the secret is very soon out. The female networks are highly social: former workers send baby pictures, Bunny loans money to various subordinates, and the gang takes breaks and cocktails together, keenly and explicity looking for male companionship. The end of the film, however, sees the female researchers busily working, models of propriety as well as efficiency. The technological threat disappears in a fog of banter and romance, in which Sumner and Bunny prove their worth to one another, more valuable together than apart, a rhetorical sleight-of-hand in which the far-from-settled battle of computers versus employees is reconfigured as the battle of the sexes, a contest long ago decided in the genre of romantic comedy at least. Enacted between Sumner and Watson (as in all Tracy and Hepburn pairings) the only result can be a tie. Slane assesses the interlinking of the marriage and computerization plots: "[t]he threat of the computer in *Desk Set* is thus domesticated—most obviously in its utility in the forging of a new heterosexual family" (74).

Desk Set is a light vehicle for the final Spencer Tracy / Katharine Hepburn film pairing. Despite the very real anxieties it provokes diegetically as well as in the world beyond the screen, the computer is treated in subordinate fashion to the primary love story. It offers neat visual furnishings—notably, a 'computerized' credit sequence and a special thank you to IBM—and is fairly easily recuperated into the service of the love plot, a mechanical 'child' of the marriage to come. Works of a more literary provenance, by contrast, took a dimmer view of mechanization. Mid-century science fiction, literary dystopia, and workds in the emerging postmodern mode cast computers in an unflattering light, concentrating critiques of capitalism run amok and of a failed scientific rationalism on the object of the machine as symbol. As the twentieth century progressed, dystopian literary and science-fictional works began to imagine machines more immediately recognizable as 'computers' to underpin their visions of the future; while the figure of the machine continues to serve as a metaphor for modernization and for new forms of social organization, it also functions more overtly as the instantiated symbol of power's operation, as a consequential *machine* that can be seen to act or be made to act in particular, usually unpleasant, ways. The dystopian societies in question are rendered not only ideologically but also functionally operational by various kinds of 'computer' systems: the narrative deployment of powerful computing machines makes mass surveillance and mass media manipulation possible and plausible in the diegetic real, and, just as importantly, the *idea* of the 'computer' offers an overarching metaphor for human organization. The most infamous and oft-cited of these narratives are, of course, George Orwell's *Nineteen Eighty-Four* (1949) and Aldous Huxley's *Brave New World* (1932).[33] These works sit at the boundary between genre (science fiction) and higher literary standing. In the genre and literary dystopian works of mid-century, human liberty, sexuality, history, and the whole of both art and nature are set against the machine. Most of these texts are still set relatively distant in the future. Novels from this period offer some of the most powerful, lingering, and compelling (if negative) images of technology, engrained into the vernacular, with the phrases like "Big Brother is watching" circulating beyond the confines of discussion of particular novels.[34]

Nineteen Eighty-Four offers the 'reactionary' cybernetic dystopia *par excellence*. In Orwell's text, 'Oceania,' a greatly reconfigured but still recognizable northern Europe, suffers under a political régime called 'Ingsoc,' or 'English Socialism.' The ideology of Ingsoc underpins a totalitarian state whose subjects are denied history, memory, and higher-level thinking processes through the employment of a variety of totalized, centralized technologies of mass media, propaganda, surveillance, and large-scale computation. In this dystopian construction, totalitarianism is made viable and efficient via technologies that extend the power of dictators in the aggregate if not in the individual. This is the computer's functional role: a dread object of vast scope and power, in the hands of cruel and repressive forces. Most chillingly, though, Ingsoc appears to be a boat without a rudder, with the iconic 'Big Brother' turning out to be merely an icon, behind whose galvanizing image faceless bureaucrats keep the totalitarian machine functioning—for the grand purpose of maintaining a status quo no one passionately believes in. This is the computer's symbolic role: 'Ingsoc' functions like a computer, blindly following a set of routines without knowledge or purpose, let alone passion or conviction. Ingsoc is a machine that maintains the operations of Ingsoc. Ingsoc deploys most of its energy fighting entropy: the perfect cybernetic system, it is devoted to maintaining stasis. For its human subjects, this entails uniformity, conformity, the control of passions, the denial of history, and even the denial of the sensory real. In a political system not only dishonest, rapacious, and violent, but also passionless and inhuman, *Nineteen Eighty-Four*'s anti-hero, Winston Smith, can only rebel by asserting his essential humanity, physical and cultural: he heretically takes a lover for sheer sensual pleasure, and retreats from the formal sterility of the bureaucratic class's routines and environments to participate in grimy, anachronistic, history-laden street life. The very irrationality of his actions, sure to be discovered, just as sure to be punished, form the true substance of his rebellious assertion of his own humanity: this is his true assault on the system. However spectacular or numerous his rebellions, though, he is finally reintegrated into the very machine he seeks to escape, reduced to the status of doddering pensioner drinking cheap gin and reconciled to love Big Brother, denied even the dignity of martyrdom. Such is the logic of the machine.

Similar technologies of surveillance and rationalization undergird the brave new world of Huxley's vision as well, although the resulting society has a more utopian gloss to it than does Orwell's relentlessly dingy and nasty 1984.[35] Predating the war, Huxley's dystopia extrapolates from the industrial utopianism and burgeoning consumerism of the early twentieth-century to describe their nightmarish apotheosis: the reduction of human subjects to vapid hedonists, cogs in a perfect capitalist machine of ever-speeded cycles of production and consumption. Huxley's no-where is set further in the future, in the year 632 AF ('After Ford'), and society runs like a well-oiled machine—maybe too much like a well-oiled machine. Humans are 'decanted' from bottles, raised in groups of clones destined for similar social status, and distinguished from one another by class-specific colour-coded uniforms.

They are 'hypnopedically' trained to class-identity, consumerism, and emotion-free sexual promiscuity. Social classes are hierarchized, with the Alpha caste consisting of the most intelligent, differentiated persons, and the Epsilon caste comprising masses of genetically sub-normal, worker-bee clones. 'Human' or humane concepts such as family feeling, grief, unhappiness, and personal destiny have been superceded by more pragmatic social arrangements: mass living; cremation of the dead and shunning of the sick; the manipulation of mood through drug use, conspicuous consumption, and sex; and class identity. As the adoption of the new, Ford-based calendar suggests, this complete reprioritization of human life is a direct consequence of the increasing technical sophistication of the early twentieth-century industrial processes, which have come to stand in as the ideal model not only of mass production, but of social organization as well. There is no need for state-sponsored coercive repression—indeed, no need for a coherent state structure—as everyone is perfectly reconciled to their position in the system. Again, what is lacking is the capacity for irrational human behaviour, the freedom, in a sense, to be *unhappy*.[36]

Orwell and Huxley's works are deeply cynical about their authors' contemporary societies, and it is worth nothing, that, as in Ray Bradbury's *Fahrenheit 451* (1953) and Margaret Atwood's *The Handmaid's Tale* (1986), one of the sure indexes of dystopia is the prizing of machine competencies over more traditional, human kinds of literacy. Joseph Tabbi is unsurprised "[t]hat the writer remains marginal and resistant to the technological culture," believing that "the predominant postmodernist concern with the compositional self preserves a romantic and modernist impulse to stand apart, to get outside the space of technological production and cultivate an aesthetic detachment" (25). This modernist impulse can be read in the fact that so many literary dystopias are predicated on a suppression of literacy (and, by extension, authorship) as much as on a promotion of technology.

If cinema explored new machine narratives and asthetics after the introduction of the computer, and literary fiction deplored the poetics of efficiency and rationality that seemed to fly in the face of the modernist cult of aethetic genius, genre fiction, too, felt the effects of the brave new world wrought by high technologies in the mid-century. Many critics see the dropping of the atomic bomb on Hiroshima and

Nagasaki as ending any innocent belief in the fundamental humanity of scientific endeavour in the West; the end of the second world war dealt a severe blow to optimistic science fiction portrayals of rational technical progress and a benevolent and wise scientific élite working for the greater public good.[37] Peter Fitting, for example, sees 'classical' science fiction's "explicit resolution of human problems through the application of technology, a resolution which displaces those problems from the socioeconomic to the technological sphere" end with the devastation of the two Japanese cities ("Modern" 61). The most pressing problems were now, it seemed, caused by technology, rather than solved by it. Warrick, too, notes in her survey of twentieth century science fiction that "[m]ost writers since World War II seemed to have difficulty creating any images except those in which technology destroys man and his environment" (xvi). She characterizes the resulting works as "reactionary" (xvi). If science fiction writers and the literary establishment were shaken, popular scientific and mass media responses were kinder to the computing machine, as its novelty afforded it the capacity to inspire wonder. *Desk Set*'s EMERAC might scare office workers, but Bush's Memex enthralled them with visions of extended rather than diminished scope for meaningful work, and for control over an increasingly hectic culture. Such hopes, in the popular realm at least, were short lived, and as the 1960s progressed, literary dystopias, bleak science fictional portrayals, and popular treatments alike concurred in negative assessments of the computer.

Apathy and Cyncism

By the mid- to late-1960s, as the high technologies of post-war multinational capital began to lose their new-car smell, and as flying cars and increased leisure time for the average worker failed to materialize, science fiction cinema became increasingly bleak and cynical, churning out dystopian visions left, right, and centre. Paranoia lost its passion and optimism fell almost totally out of fashion. As H. Bruce Franklin writes, "by the late 1960s, visions of decay and doom had become the normal Anglo-American cinematic view of our possible future" (19). Surveying 52 science fiction films that deal with an imagined human future, released between 1970 and 1982, Franklin grimly concludes that "the only future that seems unimaginable in

Hollywood is a better one" (30). This failure of imagination can be partly attributed to the exhaustion of the machine-as-symbol after a half-century of fairly recognizable 'computers' in fiction: consider that in 1973 Woody Allen undertakes a spoof of the filmic computer in *Sleeper*, in which a HAL-like artificial intelligence is used to comic dystopian effect.[38] Franklin describes scifi cinema's visions of the future from the late 1960s onward as "overwhelmingly pessimistic. No longer limited to displaced symbols of cultural anxiety, many of these films openly proclaim that their dismal futures are extrapolations of tendencies percieved in present society" (20). Vivian Sobchack also notes that science fiction films of the period 1970-77 concentrate on apocalyptic themes of overpopulation and the dystopias that result (226). Over this period, films "dramatize ... disenchantment with a 'new' technology whose hope has been exhausted, which has become 'old'—no longer hyperbolized in particularly flamboyant or celebratory special effects or fearful displays" (Sobchack 226).

Physically instantiated and established within *status quo* mid-century culture, the computer was more often a symbol of immediate anxieties about job loss, surveillance, and mechanisitic tendencies in culture than it was a free-roaming imaginary construct symbolizing the wide-open possibilities of a techno-utopian future. As the century progressed, computing machines began to operate in a much more literal as well as literary way on the cultural scene, utterly failing to bring about either the four-day work week or vacuuming robots. As it makes its effects *as object* felt, the computer's work as imaginative agent became more constrained, particularly as the engineered computer seemed restricted to large-scale, bureaucratic, mundane operations, failing its early narrative promise as much as its social one. A 1971 AFIPS/Time poll, "A National Survey of the Public's Attitudes Toward Computers," reveals a patchwork of reported beliefs that indicate a lay opinion of computing largely gleaned from experience of poorly-processed phone bills and inflammatory science fiction film, evidencing dystopian fears for artificially intelligent machines "taking over" or "disobeying instructions" (a belief held by nearly half the survey respondents). At this time, the computer comes more overtly to symbolize the current technocratic culture, and as Phyllis J. Day notes, "[t]he theme of a technocratic society maintained through a gigantic computer system is commonplace in science fiction, with many stories showing near-continuous surveillance and the constant monitoring of individual behaviour" (205). Day therefore does not question the pessimism of works like John Brunner's *The Shockwave Rider* (1975) whose bleak totalitarian dystopias seem "mere extrapolations of current practice" (194), writing that "[t]here is little doubt that we are entering an age where individual difference and uniqueness will be ground away by the requirements of technology" (208). Sobchack and Franklin both describe, in the context of science fiction film, a certain cultural ennui and disenchantment with the promise of nuclear and computer technologies that arose of the post-war cultural and scientific boom in the West.

This ennui and disenchantment is common to nearly all the depicted computers of the later 1960s and 1970s, and makes a reading for tropes across a range of texts more illustrative of contemporary practice than would an analysis of any one text or another. The unacknowledged belief that structures these narrative conflicts between solo human agents and monstrous computers is that the computer—*and all that it stands for*—is necessarily opposed to 'human' will, to memory, love, whim, and error-toleration. To understand the force of this emblematic function, consider the imagery marshalled to oppose the perceived threat of a rationalized human world. Counter-emblems, as we have seen, usually take the form of an idealized natural work, or of the heaped detritus of a failed humanistic culture, or both. Orwell's Winston Smith not only escapes (however briefly) into pastoral loveliness, but does so with a nubile young woman—the two of them further nostalgically concoct a love nest in an anachronistic and history-laden section of London; the Savage of Huxley's novel clings to the passions of Shakespeare in a world that has no use for the bard. These are the images against which computer-like machines are made to function: the whole of both culture and nature. This is why so many films have protagonists square off against these seemingly un-promising opponents, protagonists who more often than not 'awaken' from a machinic ideological dream to finally assert their freedom: this conflict is narratively gripping in technoculture because, as Donna Haraway notes, "[o]ur machines are disturbingly lively, and we ourselves frighteningly inert" ("Manifesto" 152). Hollywood film picks up where modernist literary dystopias lead. In these works, it is not the computer that is the main object of critique or the focus of societal fears. The machine has become, rather, a shorthand way to refer to inhuman drives, anti-individualism, and anti-democracy. Tabbi suggests that such negative portrayals are inevitable, claiming that "[f]or the postmodern ego which goes on romantically asserting its independence from all technological determinations, the price continues to be alienation and a deep self-division" (19).

This alienation appears in several guises, all centred around a central machine. Alienation manifests itself in cinematic visions of the future in the nightmarish combination of sexual decadence and rationalized population control in the domed post-nuclear city of *Logan's Run* (1976), where you can have sex with anyone, but you must die at age 30, by decree of the machine: real human relationships are impossible, and residents lack even family names to give them personal histories. Denied of even a name, like Logan 7, the titular hero of the austere and colourless universe of *THX 1138* (1971) is lost in a crowd of numbered humanoids once more controlled by the machine. The projected futures of these films are nightmarish collective hells from which history—the 'present' of the viewing audience—has been evacuated. Having its strong, nubile, and newly freed subjects roaming a gone-to-seed and toppled Washington DC absolutely oblivious to its historic import, *Logan's Run* forcefully suggests that (personal) dissipation and (societal) rationality result in a loss of cultural memory and meaning.[39] In the noiseless vacuum of outer space, alienation stalks the isolated astronauts Dave Bowman and Frank Poole, denoted formally in the sleek and banal pointlessness of *2001: A Space Odyssey* (1968). A self-consciously 'realistic' portrayal of space travel and high scientific endeavor, the film nevertheless carries a dark undercurrent of wide government conspiracies, and of evil, agential machines.

As generally cynical as all these films may be, they are primarily narratives that are structured around giant computers, which function as emblems, scientifically implausible but culturally potent symbols in which all the distilled ills of a failing technocultural utopian dream are made to reside. Such a dream links scientific and technical progress with rationalist economics—in other words, with the progress of late capital and the development of the postmodern condition described by Jean-François Lyotard and others. Through the 1970s, a pattern is established which links the use of computers with a rapacious capitalism, which is counterpoised against an ideal, American democracy: in *Alien* (1979), the cold and rational 'Company,' seeking to exploit a killer alien life form the danger of which it hides from its apparently disposable crew, is contrasted to heroine Ripley's passionate will to live, her fight for freedom and survival in basest physical terms. The computers are not even convincing, and it seems that the filmmaker has tried to capture an atmosphere of 'computerishness' rather than to create a computer. Other films set in the contemporaneous present also conveyed deep distrust of the technological: *Colossus: The Forbin Project* (1969) sees two giant computers bending Cold War powers to its collective will, and installing voice and video surveillance of the populated world. *Colossus* shows us the inner sanctum of a realistic-seeming American presidential régime, and it is pervaded by ego, incomprehension, and the deliberate misleading of the public. Computerized leisure park Westworld, in the 1973 movie of that name, falls prey to technological hubris when robots programmed to be shot at by tourists begin to shoot back with devastating accuracy and machinic drive; park officials aim both for a good product and a good profit, to disastrous effect—the tourists they serve are no more lovingly depicted, shown to be demanding and overindulged. In *The Terminal Man* (1974), an increasingly psychotic, paranoid, and delusional computer science wunderkind and failed family man has a microchip implanted into his brain to regulate his personality, to disastrous effect. *The Terminal Man* indicts a realistically portrayed gullible and ambulance-chasing media and a trigger-happy law enforcement system, and paints 'advanced' medical science as a callous enterprise led by a truly creepy army of white-coated, funding-chasing legion of robots, distinguished individually only by their personality flaws. Both the future-looking and present-focussed films are pessimistic about more than machines, but structure their criticism of consumer society, out-of-control militarism, and government bureaucracy around the figure of the computer.

Vivian Sobchack discusses this critical function as part of a broad trend in science fiction cinema; what her discussion skips, though, is the way in which the computer, specifically, is made to carry narrative meaning. All of these films are heavily 'computerized' in different degrees of verisimilitude, and never positively: the titular supercomputer of *Colossus* takes over the world, imposing its own version of martial law, not because it malfunctions but because it functions exactly as it was designed to. By the film's mid-point, the central conflict is between an increasingly power-hungry Colossus and the computer scientist who attempts to outwit it. As in *Colossus*, in *2001* the central battle is between man and machine, as HAL dispatches astronaut Frank Poole and attempts to do away with Dave Bowman, who struggles at length to reenter the spaceship and dismantle the malevolent computer.[40] In *Logan's Run*, also, the climactic scene again pits a single man against an immense computer: Logan gains his freedom first by learning to distrust the world-view and conduct the central computer proposes for him, and finally by engaging in an all-out, teeth-gritting, battle of will while strapped to a chair in front of the machine. The losing of this extended game of chicken causes the computer to self-destruct in an explosion of fireworks and crackling wires, and results in the freeing from mental slavery of the entire population of the dome. *The Terminal Man*'s erstwhile human/computer hybrid falls into his own grave at the end of the film, cutting short a murderous rampage and putting an end to an experiment both inhumane and out of control. The computer in these films operates as a new kind of *deus ex machina*: the destruction of the machine resolves the central conflict of the narrative, in a move of displacement allowing a much simpler solution than would otherwise be possible. The computer here operates as a cipher for the state, or media culture, or postmodern structures of capital, and the passionate resistance organized against it, as well as its ultimate violent destruction, indicate the real political and social turmoil of the period: destroying machines, though, is easier than enacting meaningful cultural change. In the 1970s, filmmakers and audiences alike seem to forget that the computer is a narrative device by which to represent the aggregate ills of late-modern society, and not itself the source or sum of these ills. Hence the mania for machine-breaking.

While the discipline of cybernetics was not articulated until the 1940s, the proto-computers of nineteenth- and early twentieth-century speculative fictions are at the core of societies that act as cybernetic systems: self-regulating, static, and rational. The imaginary future societies operate according to machine rather than human metaphors, according to paradigms of science and not 'human feeling.' At the beginning of the 21st century we may understand these distinctions to be confused, or their binary opposition to be both loaded and troublesome, the tension between 'human' and 'machine' paradigms are the central pivot in most techno-dystopian writing (and techno-utopian, for that matter) in the nineteenth and twentieth centuries. The 'computer' is the most provocative and evocative emblem of this tension. Other such emblematic objects include the steam engine in the nineteenth century, and the dynamo in the early- to mid-twentieth century. As a wondrous machine whose capacities pervade work, leisure, policing, warfare, and information-management, the computer has much broader scope to embody and symbolize both the quality and the scope of the rapid technological change that characterized the nineteenth and twentieth centuries. In the representational era directly preceding the birth of the personal computer, popular texts of the 1960s and most of the 1970s succumb to cynicism and apathy in their depictions of the technologized society which results as a necessary consequence of the adoption of the logical imperatives of machines computer-like enough to be called computers outright. In this period, the machines of fiction bear comparatively close resemblance to extant computer-technologies, and adhere quite closely to widespread public apprehensions of what computers were and what they did. Texts of this phase are almost unrelievedly bleak: if technology is the system, it is counter-democratic and inhuman.

Conclusion

In the introduction, I distinguished technoculture as something both broader and older than the postmodern cultural moment discerned by writers like Fredric Jameson and Jean-François Lyotard: these writers gesture toward the key role of technology both as symbol and structure of postmodernism without fully explicating its operations as such. Jameson glancingly suggests that the machine's emblematic function precedes the postmodern moment, coming into prominence with the industrial age. Jameson discerns a relationship rather than a transparent identity between the physically tangible machines of capitalist culture and the represented machines of literature. Turning for a moment to earlier machine ages, Jameson notes that it is "logical that the relationship to and the representation of the machine could be expected to shift dialectically with each of these qualitatively different stages of technological development" ("Cultural Logic" 36). He links cultural apprehension of machines ("relationship to") and the depiction of machines ("representation of") in a parallel construction I find significant: construing these two forms of cultural engagement with technology as parallel subjects of the same verb indicates that they act, if not together, then in ways more than arbitrarily related. If one term shifts, so does the other. Again with the use of the modifier 'qualitative,' Jameson implicitly proposes a new view of the relationship of machine technologies to lived culture, one which differs from prevailing critical practices in this area: qualitative stages of technological development are a matter of *perception* rather than physical fact.

Indeed, in at least one way the larger canon of science fictional narratives had a very material effect, interpellating subjects into particular positions *vis-à-vis* technocultural modes of being and doing. Science fiction is very often named as a deciding factor in the choosing of career paths by those who later become well-known scientists. This interpellative function of science fiction is often remarked upon, in a number of different venues. The canon of science fiction studies, as well as popular journalism on science fiction by scientists, over and over narrates the induction into science studies of young boys via the wonder born of imaginative participation in the wildly imaginative worlds described in the pulp science fiction works of the 1940s, '50s, and early '60s.[41] Steve Weinberg, Nobel prize-winning physicist, opens a piece on science fiction utopias in the *Atlantic Monthly* with the admission that what attracted him to the genre was not the science, but the fiction, "the vision of future societies that, for better or worse, would be radically different from our own" (1). Warrick articulates the cliché thus: "We've all come of age nurtured on the faith that early in the 20th century many a young mind attracted to science first came alive intellectually through reading science fiction" (152).[42]

These tales of narrative seduction (by science fiction stories) into material practice (of a scientific career) hint at the mutually enriching relationship I want to describe in this work as existing between imagined and assembled computers. That these narratives are, by most accounts, woefully divorced from mere plausibility, not to mention actual computing practice, indicates that it is not the straight exegesis and explication of material technologies that exerts such powerful sway, but rather the function and characterization of these machines in compelling narrative forms. It is not the computer as engineered object, that is, but the aura which surrounds the computer-like machine that influences the reader, its myth-function, its metaphoricity, its symbolism. In this, it is akin to powerful machines of all sorts, made for at least a century to bear meaning exceeding utility. Porush nominates the computer as a special case, as a metaphor established "with daring and remarkable rapidity" (xi) but this simply isn't true: the computer-as-metaphor—or, the computer as legacy system, as I have proposed here—results from the accretion and amendment of prior symbols, anxieties, and cultural narratives, fictional and factual, that circulate around the computing machine, and surfeit it with meaning. Were it not for the failed promise of the computer of the Gernsback-era science fiction dream, the cynicism of the 1970s could not have been so deep. Without the industrialization of the factory, chronicled by photographers like Lewis Hine and fictionalized to differing effect in *Metropolis* and *Modern Times*, how are we to understand the white-collar panic over the potential computerization of the office, such as can be seen in *Desk Set* and the 1965 *Time* cover? There is a discernible link, too, between the clean beauty of the dynamo as a generator of power and awe that Henry Adams describes and the publicly-displayed mid-century corporate computer, generator of information and thus of a power of a different sort.

However, Jameson denies such filiations, claiming that in contrast to the "mimetic idolatry" manifested in the representation of modernist technologies like the dynamo, the steam engine, and the railroad train, "[i]t is immediately obvious that the technology of our own moment no longer possesses this same capacity for representation" ("Cultural Logic" 36). He goes so far as to claim that the computer's "outer shell has no emblematic or visual power" (37). The uncanny *Time* cover, if nothing else, would suggest that this is simply untrue. While Jameson is trying to make the larger point that late twentieth century computing technologies operate as part of late capitalism—the third machine age—rather than within the modernist paradigm, I think he fails to notice the very modernist representations that accrued to early computers, or these machines' filiation to the technologies of production prey to mimetic idolatry. With Tabbi, I argue that although the computer's operations are not as transparent of purpose or operation as were earlier machines, "this representational insufficiency does not prevent us from reflecting imaginatively—or even acting—on the technology of our own time. Its products, operations, and reproductive methods can still be brought together as an *ad hoc*, indeterminate sign system that does not require consistency among its parts" (Tabbi 20). Like Porush, Jameson makes of the computer a special case, designating it as a particularly postmodern technology not recoverable via "mere thematic representation" (37). Acknowledging the power of the machine as symbol, though, Jameson's periodization of the history of capital in *Postmodernism, or, the Cultural Logic of Capitalism* is early characterized as a series of machine ages, of which we are currently in the third (36).[43] Jameson establishes the extra-physical aspect of the interrelation of represented machines and the social structures of Third Machine Age, reading these machines as contemporary markers of a postmodern sublime, as 'intensities' evocative of a "whole new type of emotional ground tone" (6) and "narratively mobilized" to grapple with the postmodern condition. Jameson's construction supports (despite itself) my notion of a legacy system of fiction that is not merely riding the coattails of engineering, but is tied to a much less expert, much less physically tangible cultural 'sense' of the nature and purpose of computing machines. This is especially true prior to the introduction of computers meant for mass use by individuals, when the general relationship of non-engineers to computers was almost entirely imaginary, or at least at several removes from the machine itself.

The machines of the Jameson's postmodern technological sublime, emblematized by the 'personal computer,' gain meaning in the context of the legacy system identified in this chapter, as the next section will show. The texts and images identified here—Bush's desire for machine-enabled transparent and friction-free intellectual work, the Little Tramp in the machine, *Metropolis*'s industrial hive, *Nineteen Eighty-Four*'s bleak totalitarianism, personal battles between human agents and supercomputers, and more—recur in the 1980s, and are indeed *remediated* in the construction of the personal computer.[44] By the late 1970s, as we have seen, the legacy system seems to exhaust itself of hope, creativity, and energy. This is the backdrop against which the 'personal computer' emerges. The 'personal computer,' rather than rehabilitate the exhausted computer of the legacy system, defines itself through and against this cultural inheritance. The quality and scale of the break between personal and other kinds of computers that occurs in the 1980s is the subject of the next section. "Machine of the Year" examines a wide range of popular texts—films, books, advertisements, computing machines themselves—of the 1980s, and, in the light of insights provided by taking the longer view of 'computers in literature,' categorizes these more recent texts according to the kinds of narrative work the computers are made to do in them.

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[1] This definition itself hints at the august stature of most legacy systems: when was the last time you interacted with a mainframe or a minicomputer, two machines that, as we saw in Chapter 1, the microcomputer was supposed to completely supercede? Of course, that particular promise was never workable, as there will always be tasks to which larger-scale computing machines will be more appropriately directed than will desktop machines. However, the stunning anachronism of the legacy system is illuminated by this reference: mainframes and minicomputers, to most end users, are *hopelessly* outdated.

[2] I do not expect an exception to be granted to the dissertation currently under examination. ☺

[3] Mincing no words, the jargon file describes a kluge (under the entry for its variant, 'kludge') as "a crock that works"—the cross reference to the entry for 'crock' indicates that it is derived from "the American scatologism 'crock of shit.'"

[4] This programming problem is offered not as representative, but as easy to understand.

[5] Martin Campbell-Kelly and William Aspray begin their book, *Computer: A History of the Information Machine*, with a section entitled "Before the Computer," outlining computation since the time of Charles Babbage; "Creating the Computer" begins with World War II. Herman Goldstine's insider memoir *The Computer from Pascal to Von Neumann* uses a similar structure, as does Harry Wulforst's *Breakthrough to the Computer Age*, also an insider memoir. Paul Ceruzzi's academic history begins directly with the second world war, as does R. Moreau's *The Computer Comes of Age.*

[6] Some critics miss the opportunity to engage with this mythic function, choosing to deride such symbolic uses as hopeless outdated. In this vein, Patricia Warrick laments that, in addition to failing to accurately portray computers, "the SF about computers often unexpectedly gives the machine supernatural characteristics and turns it into a god, a surprising throwback to the attitude of the ancients" (232).

[7] This may seem an obvious point to make, but as we shall see, the distinction between 'real' and fictional computers often tends to be lost among critics so eager to prove that they know their technology that they fail to recall that imaginative literature is just that—imaginative.

[8] The metaphor of 'legacy systems,' in fact, describes most cultural materialist readings of literatures over time—as such readings are often concerned with the interaction between certain kinds of textual narratives and lived systems of discourse, they show extra-literary shifts and jumps as much as aesthetic development.

[9] Over and above the fact that most literary analysts do not place such rigid limits on their studies, I find it ironic that Warrick, in her aim to be computer-scientific, hits upon a definition of an imaginary machine that is much more rigid than the definitions that computer industry professionals set for themselves. If you look back to the above-cited defintions of 'legacy system' offered by these professionals, you will note that these are much less rigorously engineering-based than Warrick's definition of literary computers. The legacy system, by contrast, is defined by its place in human affairs—its cost, its scale, its importance—and by a perceived consensus that agrees that it is such.

[10] Indeed, Warrick collects numerous otherwise arcane texts in an excellent collection, *Machines That Think: The Best Science Fiction Stories About Robots and Computers*, that she co-edited with Isaac Asimov and Martin H. Greenberg.

[11] What would she think of the failure of imagination often manifested by the computing pioneers she so admires? The narratives of computer history are enlivened by tales of predictions-gone-wrong, of rash statements by high-placed industry types who were not grand enough in their predictions of the might and spread of computing. Consider Bill Gates' assertion that 64k of RAM would certainly always be enough for any user—and computers now routinely ship with 256MB, roughly 4000 times that amount. Or Thomas Watson Sr.'s comment that he did not see a world market for computers ever exceeding, say, five. These men were speaking from within the confines of a legacy system of understanding—their understanding had not yet shifted into a newer register.

[12] I've singled Warrick's text out for special consideration precisely because it is such an important work to this study, but *The Cybernetic Imagination* is by no means alone in its preoccupation with verisimilitude. Two articles in *Patterns of the Fantastic* (1985), for example, also base their readings of science fiction in tests of 'realism': Lawrence Charters wishes for more "realistic stories dealing

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with computer intelligence" (51), while Constance Mellott prizes one cybernetic text over another because, "since it talks about the IBM series of computers and uses a lot of computer jargon, somehow comes across as more realistic" (48). In an article on Forster's 'The Machine Stops', Marcia Seabury asks of the titular technology, "dare we call it a computer?" (3), and answers in the affirmative on the basis of an *anachronistic* realism test. I find it significant that verisimilitude is, in many of these cases, based on the perception of realism, not realism itself.

[13] The entirety of Herbert Sussman's *Victorians and the Machine: The Literary Response to Technology* is devoted to the pervasion of machines as symbols, and mechanization as a central concern, in the works of such Victorian heavyweights as Thomas Carlyle, John Ruskin, Charles Dickens, William Morris, and Rudyard Kipling, as well as H. G. Wells, whose work I will address here.

[14] In addition to reflecting and focussing broad popular trends in the apprehension of technology-in-culture, texts deploying computers and computer-like machines respond to generic imperatives that differ from genre to genre, medium to medium. The trajectory of the computer is slightly different in film than it is in hard sf, for example. Bearing this in mind, it is still possible to usefully organize texts into 'trends' that seem to exist pan-generically, and which, taken together, can be understood to comprise the legacy system underpinning the cultural operation of the 'personal computer' in the 1980s.

[15] Other people begin earlier, of course: David Porush, in *The Soft Machine: Cybernetic Fiction* offers a compelling reading of the technology of *Gulliver's Travels*, claiming that "Swift's Lagadan Word Machine is one of the first literary uses of the machine as a metaphor. It is a rich one, for not only does it satirize all short cuts to true knowledge ... it is also one of the first instances of automation being shown displacing humans not only as laboureres but as thinkers" (6).

[16] Indeed, Fogg suggests that the genre of 'dystopia' owes its existence to the Victorian ambivalence to machine technology. He notes that utopias and dystopias represent basically the same social realities, but construe them in opposing ways: "Twentieth century utopias also tend to be twentieth century dystopias. Dystopian writers seem to see totally different meanings in the technolgoical possibilities" (66).

[17] Importantly, the visibility of this process of industralization was as essential as the experience of its material reality in provoking such strong and frequent comment. If the industrialization of Britain had been occurring throughout the eighteenth century, it was not until well into the nineteenth that steam technology first brought heavy industry into the city from rural areas, where textile mills had been dependent on water flow, and hidden from the view of most.[17] Life in the city remained largely untouched—until the establishment of freight and passenger rail service and steam-powered industrial machines (Sussman 9). The steam-powered railway is certainly a pivotal technology, not just in terms of engineering, but in light of the great public reaction it elicited. Sussman describes the police presence, the erection of barricades, and the generally extreme level of panic-preparedness that attended the opening run of the Liverpool Manchester Railway in 1830. There were fears that the spectacle of a locomotive machine bearing 600 persons into the station, "a sight entirely new to human experience," would cause a riot (Sussman 1). The later nineteenth century witnessed a dramatic and wide-ranging change in scenery and the sensation of life for the mass of its citizens. The steam-powered rail locomotive brought urban dwellers into contact with the industrial areas of the countryside, as well as into the industrial cities of the north. Likewise, the steam engine also brought heavy industry into London, as its use of coal as a primary fuel reduced dependence on the running water of rivers as a power source. The relocation of heavy industry from the countryside to the city brought the process of mechanization into the view of major literary and social figures, who tended to be city-dwellers, and who would subsequently incorporate their new knowledge in their writings. The machine also changed the sensation of life for more than those urban residents heretofore unaccustomed to industrial processes: to a citizenry accustomed to stage coaches for any and all significant travel, for example, the visual cacophony produced by the speed and (relative) smoothness of rail travel was stunning. Similarly, the re-engineering of the landscape necessary for the building of railways, the grading, the precise curves, the regularity of track, offered another dramatic visual cue that great change was afoot. Perhaps overstating the case, Sussman thus describes the scale of the change to the landscape: "Gods may change, churches remain very much the same; but the machine transformed the very appearance of the visual world" (2).

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[18] And it's the reason the telegraph, named recently in a book title as 'the Victorian Internet' is not the computer-like machine of the era. Undoubtedly, the development of the telegraph changed written correspondence, and altered the sense of space in time in the speed with which it could traverse distance. But it was nowhere near so prevalent a cultural symbol of the age, appearing neither so frequently nor so widely as the railway engine specifically or the 'machine' generally. I wouldn't want to quibble over which technology may or may not be more important or more radical: recall that I eschewed such a project in the introduction. Rather, I choose the engine over the telegraph because, in the age in question, the machine engine was clearly more potent and popular a symbol of the times.

[19] In this assessment Wells finds himself in agreement with Fredric Jameson's periodization of the Victorian century as the second machine age, emblematized by the railway and characterized primarily as an age of market capitalism, realism as the primary mode of literary production, and of technologies of mass production (36).

[20] Kumar shows that from the time of Thomas More, utopias proposed stable, unchanging, perfect societies, variously enabled by social or mechanical technologies to maintain a happy stasis—such a view was no longer suited to industrializing, increasingly 'progress-based' European societies of the nineteenth century: "Utopia, which clung to the older modes of thinking, became increasingly feeble and fragmented, increasingly marginal to the main intellectual developments of the age" (Kumar 39). Indeed, some writers on utopia suggest that the industrial revolution of the nineteenth century renewed what had become moribund genre: the age of the machine reinvented and revitalized utopian writing. *A propos* technology specifically, Kumar muses that "recent and spectacular technological achievements [such as the laying of the transatlantic telegraph cable in 1874] no doubt played their part in stimulating the utopian imagination" (65-6). In part owing to the rapid and rampant industrialization of Europe, the nineteenth-century utopia experienced a movement away from stasis and towards a narrative of infinite progress such as that proposed by Bacon. At this time, also, utopias are relocated from isolated or undiscovered spaces and arcadian mores to the known world in future times. In short, utopia begins, in the industrializing nineteenth century, to resemble science fiction.

[21] Indeed, if sheer production can be used to gauge the new relevance of utopian writing, the growth in the number of utopian writings in the nineteenth century ought to convince us: it can be charted as an exponential curve. In "Themes in Utopian Fiction Before Wells," Lyman Sargent undertakes to summarize trends in utopian writing from More's text forward. He also counts utopian texts as number-per-century until the nineteenth, then splits that century into pre-Bellamy and post-Bellamy-pre-Wells. Charting these figures gives an exponential curve, and suggests the utopia explosion that Sargent notes but does not quantify as occuring in the twentieth-century.

[22] The confusion and ambivalence arising from the conflation of science and technology in public discourse in the nineteenth century ranged along two lines of contradiction: first, most writers supported the increase of material comfort arising from technological progress but decried the ugliness of the process and its machines; second, intellectuals of the period railed against the mechanistic thought that attended the industrial revolution, but admired the explanatory power and conceptual elegance of systematic 'scientific' thinking such as Charles Darwin's (Haynes 69). According to Sussman, this contradictory position led to the development of two antithetical literary modes. One mode, addressing the awesome ugliness of industrial machine technology, either denounced it in starkly realistic portrayals (Dickens took this route in *Hard Times*) or retreated into various romantic visions of escape into the pastoral (for example, William Morris in *News from Nowhere*) (7). Sussman's approach works well in his readings of Dickens, Morris, and Ruskin; however, his antithetical model is not sufficient, I feel, to fully describing emerging science fictions. The work of H. G. Wells, for example, adheres to neither mode.

[23] Such as the kind that indicates the attainment of a classical utopia, incidentally.

[24] In fact, Remington strongly admonishes current critics to cease and desist from reading "The Book of the Machines" chapters as proto-science fiction, or indeed as at all concerned with mechanization per se. He goes to lengths to show, and probably truthfully, that Butler did not intend for this section of the book to be read as a promotion of machine breaking, or as denoting a serious fear of machine evolution. However, despite the fact that Butler may well have aimed to satirize only the badly-done Darwinism of the tract-writer, the resultant chapters do indeed resonate, and not just with today's writers, as scenarios to be afraid of.

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[25] Wells began writing his 'scientific romances' in the last decade of the ninteenth century, and his influence on utopia and on the new genre of science fiction was so great that some critics separate their studies into works appearing pre- and post-Wells (Sargent, Krishan).

[26] While the dynamo was perhaps the central icon of modernist technology, others were used less frequently to the same effect—the idea of 'robots' comes to us from the early 1920s, a coinage from the Czech word for 'drudgery.' Karel Capek's 1923 play *R.U.R (Rossum's Universal Robots)* narrates a capitalist utopia in which cheap, mass-produced 'artificial men' reduce production costs, increasing industrial profit while decreasing consumer cost. It is perfect until the system reaches its rational conclusion: humanity decreases the efficiency of the system and must be eliminated, which the robots do with heartless efficiency. Chillingly, the industrialists who perfected and produced the robots can't seem to help admiring this next, logical step in the career of their 'progeny.'

[27] Chaplin, a canny director, musician, and writer, in addition to his talents as an actor, was ambivalent about the coming of sound to the movies. He understood the Little Tramp to be fundamentally a figure of pantomime. The use of sound in *Modern Times* is therefore careful and deliberate: the film makes extensive use of synchronized scoring—that is, music that is cued and paced to the action of the story—but the only dialogue comes at the end, in a segment called 'The Singing Waiter.' In this sequence, the Little Tramp opens his mouth to issue … a gibberish song. Dialogue of a sort, perhaps, but avoiding the general trend of talkies toward dialogue, and proving Chaplin's point that the pantomime aspects of his art could work within the sych sound format.

[28] See the machine, the 'Voder' or 'Voice operated recorder', replete with female operator and quote from Bush, at http://www.obsolete.com/120_years/machines/vocoder/.

[29] Broege's article is entitled "Electric Eve: Images of Female Computers in Science Fiction" and, as one might expect, for her, the gendering of a machine is part of a project of anthropomophization. To be clear, my own analysis can read the gendering of a machine—that is, the ascription to a machine of characteristics (size, shape, role, power, etc.) connoting a gender position—as distinct from personification. A computer doesn't have to be a fully realized narrative or social subject in order to be gendered. In fact, the fluid and context-sensitive gendering of computing machines plays an important role in the repositioning of computing as a mass activity in the 1980s, as we will see.

[30] In any case, the choice of a female attendant for the machine is historically accurate: most photographs show women operating large computing machines.

[31] For the coincidence file: *Desk Set* screenwriter Pheobe Ephron is the mother of screenwriter/director Nora Ephron, whose 1995 *You've Got Mail* starred a later golden Hollywood couple, Tom Hanks and Meg Ryan, in another computer-enabled narrative of true love and economic insecurity. Weird.

[32] In "The Party Line," an essay appearing in *Processed Lives: Gender and Technology in Everyday Life*, B. Ruby Rich traces gendered uses of the telephone, firmly embedding the technology in a network of sanctioned and illicit social practices. Lana F. Rakow addresses this issue at greater length, too, in "Women and the Telephone: The Gendering of a Communications Technology," published in *Technology and Women's Voices*.

[33] E. M. Forster took a kick at the technodystopian can, and covers much the same ground as Wells's Time Traveller in his "The Machine Stops" (1909). In this story, centralized computer-like systems have rationalized human existence to such an extent that no one ever leaves the subterranean, numbered cubicle they have been assigned to dwell in; that is, they don't leave until the machines dramatically malfunction and it becomes apparent that no one is qualified to diagnose or solve the problem. Like *The Time Machine* and *Erewhon*, "The Machine Stops" suggest that labour-saving, quasi-intelligent machines both giveth (freedom from toil) and taketh away (control over, and understanding of, a society grown beyond human scale). Vashti, mother of iconoclastic Kuno, devises a religion based on worshipping the instruction book that mediates one's relationship with 'the Machine.' Touch makes her nervous, and she is much more concerned with maintaining her ease than with easing her son's concerns about living within the confines of the machine.As in *Nineteen Eighty-Four* and *Brave New World*, maternal feeling is markedly absent, and the technological is prized over the human.

[34] Of course, in the calendrical 1984, there was a spate of Orwell conferences and publications devoted to a comparison between the current and the apparently projected: see, for example, Robert Mulvihill, ed, *Reflections on America in 1984: An Orwell Symposium*, Tom Winnifrith and William V.

Whitehead, *1984 and All's Well?*, and Paul Chilpin and Crispin Aubrey, eds, *Nineteen Eighty-Four in 1984.*

[35] And, as we saw in the previous chapter, computer histories often view Orwell's and Huxley's techno-topias as opposed, with the former characterized as a 'bad future' and the latter a desirable one.

[36] The same motif pitting the idiosycracies and wonders of human history and culture against passionless and sweeping computer-led rationalization anchors the narratives of Ray Bradbury's *Fahrenheit 451* (1953) and Kurt Vonnegut's *Player Piano* (1952): like Orwell's Winston Smith and Huxley's 'Savage,' the heroes of these novels find they can only assert true agency and individualism through passionate, irrational behaviour, by having affairs, wielding guns, running away from home. *Player Piano*, Vonnegut's first novel, tells the tale of post-WW3 American society where rationalization extends from the factory floor, to the educational process, to the wider economy, and into the home. Bradbury's *Fahrenheit 451* evinces a generic kinship to Huxley's mass-mediated, a-literate dystopian vision whose salvation is to be effected via self-consciously high cultural practices. The technologized, rationalized, and mediatized society is combatted by exiled university professors, memorizing print works and hiding in the wilds beyond the city: again, nature and (literate) culture are hysterically (if somewhat ridiculously) called up to oppose the progress of the machine and all that it represents.

[37] David Porush offers a dissenting view. He proposes instead the development of the field of cybernetics as a fulcrum pivoting sciene-fictional and literary-utopian characterizations of the machine from the hopeful to the distrustful. Cybernetics, the science of self-regulating systems, was inaugurated in the 1940s by an interdisciplinary group of scientists to explain the maintenance of order and meaning in complex systems—partly in order to combat the metaphysical terrors brought about by recent theories in physics that suggested the Earth was moving into a state of ever greater entropy, or disorder. According to Porush, after cybernetics, "literature that concerned itself with philosophical questions could no longer comfortably embrace the machine metaphor. By the early 1950s there is a definite hostility towards technology" ("Reading" 56).

[38] Winnipeg actor Douglas Rain provided the voice for both computers (IMDB).

[39] This shock of recognition, whereby narrative protagonists and the viewer alike come to see the heretofore alien as simply as temporal displacement in a previously meaningful space provides the final insult to humanity in *Planet of the Apes* (1968) as well: the final images of that film show a decayed and toppled Statue of Liberty on a desolate beach, to chilling effect.

[40] Obviously, there are other very major things going on in this film: what is all this business with monoliths and monkeys at the beginning, and with linear-time challenged Dave-in-space (in what appears to be one of the hotel rooms from *The Shining*) at the end. Complex narrative or no, the conflict between Dave and HAL generates a great deal of tension within the film, and a great deal of attention without. It is one of the most memorable, and, importantly, culturally *legible* moments of the film.

[41] It is usually a male narrative, although Alluquère Rosanne Stone's *bildungsroman* referenced in the introduction is a twist on this narrative, all the while that it self-consciously references it (Stone 187n1).

[42] Strangely, the very strong proselytizing function of science fiction on youth who later became prominent in the fields of 'hard science' then deemed so lacking in that same fiction is left unexamined in the rush to pooh-pooh its scientific naïveté or incompetence. Warrick dismisses many of these stories outright, because the writer of computer stories is generally "ill informed about information theory and computer technology and lags behind present developments instead of anticipating the future" (xvii). If the science is so poor in these tales, and they still beget by influence mass numbers of scientists, surely we need to reread these stories through a different critical lens to discern the source of their power?

[43] Jameson is building on Ernest Mandel's work in *Late Capitalism*. Machine ages are linked to eras of capitalism; this third age, of which computing technologies are emblematic, is linked to 'postindustrialism' or postmodern capitalism (36-7).

[44] "Remediated" is a term derived from Bolter and Grusin's *Remediations*—remediation is "the representation of one medium in another medium" (45). They describe this as a process occurring between distinct media, like film remediating the stage, or photography remediating painting, and the term is flexible enough to denote a mutual process leaving neither medium intact. Such I use it here,

with the minor caveat that I employ it to name a new computing machine's remediation of an older machine.

Part II: Machine of the Year: The Computer Moves In

The engineered computer and 'cybernetic fiction' were each revived in the 1980s by the appearance of a new embodied and narrative machine: the 'personal computer.'[1] Paul Edwards, in his study of the links between discourses of computing and Cold War politics, notes this change, remarking that "[b]y the early 1980s, the simplistic computers-out-of-control that dominated the 1960s and 1970s were replaced by a more sophisticated awareness" of computing machines, computing practices, and computing subjects (327). Unlike the legacy 'computer,' whose imaginary and pragmatic cultural operations were always understood to be mediated by a field of expert tenders—and thus whose signification of institutional power, of governmental bureaucracy, and of scientific elitism might just as easily be concocted in the absence of any direct interaction with it—the signifier 'personal computer' is, at its most basic syntactic level, predicated on individualized physical interaction between computer object and non-expert human agent. In the 1980s, the machine changes not only its scale, from mainframe to microcomputer, but also its avowed purpose. Over the course of the decade, computing is reconstrued as an individual activity: the 'personal computer' becomes legible as a technology of widespread, inexpert, consumer use. According to Edwards, such rehabilitation of reputation "had much to do with the arrival of home or 'personal' computers" (327). The nature of this 'arrival' is not described. At the time of its ascension to "Machine of the Year" status, the personal computer was still very much a hobby machine; its rhetorical reach far exceeded its embodied grasp. Like the 'computer' described by the accreted legacy system of Part I, the 'personal computer' carries meaning in the decade out of proportion with its pragmatic significance in the operations of most people's daily lives—meaning exceeding its instrumental applications. This is especially true in the 1980s, when, in the absence of widespread physical interaction with the machine, the computer could nevertheless be nominated as "Machine of the Year" and lauded for its impact on the lives of individual citizens, consumers, schoolchildren, and families. Its significance as cultural agent had to be conferred at some point and by some means; this would constitute the 'arrival' Edwards notes as essential to the rehabilitation of the computer in the public eye.

The 'personal computer' is a *material metaphor*, in Hayles's sense, in that its function as sign works to "foreground the traffic between words and physical artifacts" (*Writing Machines* 23). The material metaphor 'personal computer' traffics at once in words, concepts, and engineered components. It comprises both the microcomputer-object and the set of practices and beliefs that configure it as useful for individual use. The microcomputer, engineered machine, instantiates the culmination of advances in technique that increased the overall power of computing machines while at the same time reducing the size and lowering the production cost of the resulting machine-object, a machine we can nevertheless recognize as a descendant of earlier computing technologies. The microcomputer, roughly, is the miniaturized and generalized integrated circuit, cheaply produced—this in relation to the computers that came before it. But the 'personal computer' is something different, a social object that exceeds this technical specification, in much the same way that the social circulation of the sign 'computer' exceeded and often contradicted the uses and characteristics of the engineered machine it worked to make sense of. At once machine and idea, the 'personal computer' is a rhetorical artifact whose coherence as distinct object is largely effected through extra-engineering practices—through narrative. In the 1980s, microcomputing machines began to make more and different appearances in fiction than had their bulkier predecessors. As microcomputer objects attained a growing (if still marginal) presence in the consumer marketplace and in the world of work and entertainment, too, advertising texts, marketing strategies, and product design also inscribed meaning on the material metaphor 'personal computer.' Unlike the microcomputer-object, the 'personal computer' explicitly rejects affiliation with both its narrative and physical forebears; in fictional and non-fictional texts alike, it is represented as fundamentally *new*. In this decade, material practices of computing did in fact change rapidly, profoundly, and permanently: computing has indeed become an individualized practice, and most desks (in the Western world, at least) do have computers on them, machines integral to the business of both work and leisure. Fictional and prognosticatory narratives radically rewrote the role of technology in culture and reconceived the practices and texture of everyday life, via evocations of new machines and new subjectivities to navigate new realities, in ways that have come to seem prescient or at least plausible. Truly, the appearance in the 1980s of this 'personal computer' would seem to present a Kuhnian revolution, or paradigm shift, and, indeed, the rhetoric of revolution pervades texts of the decade, a tendency especially pronounced in non-fiction.

For Kuhn, a revolution in thinking is marked by a "non-cumulative developmental episode in which an older paradigm is replaced in whole or in part by an incompatible new one" (316). In this vein, Edwards notes, "[t]he computer as panoptic Other was, frequently, rehabilitated as merely … a companion and friend" (327). As a new paradigm is necessarily completely incompatible with the one it replaces, the move from one to the other cannot be based on logic, since what counts as 'logical' is determined by the paradigm to which one adheres. Rather, opposing parties must argue from within their own paradigms, aiming at persuasion rather than proof. Kuhn therefore suggests that an attention to the "techniques of persuasive argumentation" is necessary to the understanding of a given scientific revolution (317). This powerful sway exerted by argument rather than proof is even more apparent in inexpert public discourses of computing, as the computer here functions largely as a symbol at one remove from those for whom it is so meaningful. Computer scientist Ulrich Neisser notes that "[t]he computing machine serves not only as a tool but as a metaphor; as a way of conceptualizing man and society … Having taken deep roots and being partially unconscious it is partially invulnerable to evidence" (qtd. in Porush 1).

It is precisely through 'techniques of persuasive argumentation,' then, that the material metaphor of 'personal computer' attains coherence and legibility in the 1980s, apparently overthrowing the 'normal computing' established since the 1950s. First, the new machine is sharply distinguished from its forebears, as it is proposed as a radically new technology. Second, newly-emptied of its legacy associations, the sign 'personal computer' is filled to surfeit with fresh meanings that reinforce the distinction between itself and the 'computer,' such as was established in the legacy system. Emblematic in this regard is Apple Computer's inaugural television commercial for its new Macintosh (Scott). The computer was introduced to consumers in an advertisement a mere sixty seconds long, and which aired only once as a paid spot, during the 1984 Superbowl. In a decade of computing marvels, the Macintosh stood out as yet another staggering advance in engineered microcomputing technology: among other innovations, the Mac was the first consumer machine to feature a graphical user interface, a gray-scale bitmapped windows-and-mouse interface.[2] And yet, despite very real and immediately visually perceptible design and interface differences between the Macintosh and everything that had come before it, including the industry-standard IBM PC and Apple's own successful Apple II series, the ad did not even show the new computer.[3] James Twitchell finds it remarkable that "[w]ithout mentioning the simple Motorola 6800 processor, without mentioning the affordable price of $2,500, without claiming home as opposed to office use, without foregrounding the mouse, without showing a new graphic interface using icons," the ad is nevertheless compelling (190). What this advertising strategy suggests though, is the incommensurability between the advertised machine and the meaning it is made to bear: the microcomputer object is insufficient to the task of explaining itself to its target demographic.

As Kuhn suggests, and Neisser reasserts, scientific—or computing—revolutions are invulnerable to logical argument, and must depend on persuasive gestures instead. Such gestures tend to excess and hysteria; inaccessible to logic, they must perforce depend on compelling narrative. And so the introductory Macintosh television spot depicts a recognizably Orwellian dystopian society, with emaciated and grey workers shown in thrall to a large screen from which a nasty-looking televised figurehead proclaims the "flowering of the garden of pure ideology." A pretty, athletic blonde woman in red shorts races onto the scene, smashing the idol on the screen with a great cry and an Olympic-calibre hammer throw. Her white tank top is emblazoned with the 'Picasso-esque' logo for the new Macintosh—a colourful impressionistic line drawing of the little machine.[4] As the screen fades to black, and Apple's rainbow-apple corporate logo comes into focus, a voice-over informs us that, with the introduction of the Macintosh, consumers will be assured that "1984 won't be like *Nineteen-Eighty Four*." The ad—a mash of cinematic and literary citations, exploiting gender stereotypes, making industry insider jokes, and running during a much-hyped sporting contest as a one-time event—demonstrates a hysteria of representation, as well as a reliance on legacy narrative and extra-technical cultural associations upon which promotion of the new personal computer depended for its legibility, common to depictions of personal computing in this period.

The Macintosh "1984" spot also exemplifies how tightly the imagined and the engineered, the technical and the narrative, are interwoven in the material metaphor of personalized computing. As noted above, the paradigm shift of the 1980s involves not only a revolution in imaginative representation, but real change in the social life of the actual computing machines as well. I have been careful thus far to distinguish between the microcomputing object and the material metaphor 'personal computer,' to make a point about its narrative as well as physical qualities, but such a separation is impossible to maintain and ultimately undesirable, in any case. As the "1984" ad demonstrates, new machines, no matter how 'user-friendly' they may be, are not legible as personal technologies without the persuasive argumentation provided by accumulated imaginative representations. Nor, on the other hand, are much-anticipated individualized computing practices attainable without the machines on which they are to occur. As a result, the process of meaning-inscription was substantially abetted by the fledgling microcomputing industry (mainly hardware developers) whose advertising aimed squarely at individual purchasers, depicting the machines in settings of individual use so they could be sold as such. And so an analysis of the 'personal computer' is incomplete without a consideration of industrial practices and the machines they produce and disseminate. The machines themselves, through careful design and manufacturing considerations, also signify certain kinds of uses, certain target consumer/subjects; more materially still, pricing considerations configure particular machines as individual-use or not. The 'personal computer,' in short, is a creature of fiction, of imagination, of marketing, and of production, attaining coherence as a meaningful object across these various realms in the 1980s.

Such a statement begs the question: "where does technology come from," which John Staudenmeier identifies as a key concern undergirding much of the work published in the journal *Technology and Culture* (35). In *Technology's Storytellers*, Staudenmeier examines and categorizes the work appearing in the first 30 years of the journal's publication. This question is at the heart of the current analysis as well; the answer is implicit in the concept of the material metaphor of personal computing. Staudenmeier's articulation of technological innovation is essential to determining the material metaphoricity of machines, their imbrication of engineering and cultural practice. In Staudenmeier's taxonomy, the processes of emerging technology include not only *invention*, generally understood to be the purview of irreducible individual genius, but also the more social processes of *development* and *innovation*, stages that see an engineering breakthrough molded to the needs of the market, and tempered by immersion into an existing culture that can or cannot, will or will not, adopt it into its operations. These methods of understanding technology's life-cycle, importantly, do not oppose a 'technical' history to a 'cultural' one to attain a sort of balance-in-tension between competing discourses: both approaches interrogate technique's state of the art in its relation to a broadly understood social receptivity to technology.[5] Staudenmeier notes that:

> The three stages of emerging technology are differentiated by the increasingly complex and uncontrollable character of the ambience within which the new technical design must operate. At the level of invention one asks, "Is it a good idea?" At the level of development one asks, "Can we get this design to function within the constraints of our situation?" At the level of innovation one asks, "Will this new artifact survive in the wide world?" (50).

The cycle of innovation is determined by engagements with the wider social universe, rather than flashing from an individual's actions and thought. "Innovation" names the process by which a technology is launched, successfully or unsuccessfully, into the so-called real world. Innovation in this sense comprises product design, marketing, and sales concerns—the industrial practices I name above as key to the legibility of the 'personal computer.' It also, though, presupposes a particular cultural ground into which such seeds are sown—the "wide world" of Staudenmeier's description above. Such is the field provided by the imaginative texts of fiction and popular journalism. In large part, then, the process of innovation that established the personal computer as an individual-use, desirable technology distinct from earlier computing machines took place in inexpert, popular texts. Specifically, the vast majority of people had more contact with the computers and personal computers of Hollywood and cyberpunk than they did with physically instantiated machines. And so we look to these texts for their inscriptions of meaning onto the 'personal computer.'

The arrival of the 'personal computer' in cinema and literature marked a radical break with previous representational modes. This break was twofold, consisting first in the assertion of a revolutionary difference between the new machine and its predecessors, and, second, in the cracking of barriers between previously distinct representational genres. The first break is a narrative disjuncture; briefly, it consists of the recharacterization of the machine heretofore known as 'the computer,' a machine long depicted either ambivalently or negatively, as 'the personal computer.' This 'new' machine was demonstrated to be personally empowering—so empowering, in fact, that it can be used to mitigate the ill effects brought about by the earlier articulated 'computer,' thus transforming computing/computers from the dread practices and terrifying objects depicted in the 1970s. In her *Screening Space: The American Science Fiction Film*, Vivian Sobchack makes the case for a dramatic representational shift in science fiction films from about 1977, with the release of Steven Spielberg's *Close Encounters of the Third Kind* and George Lucas' *Star Wars*.[6] These films mark the beginning of a new 'golden age' of science fiction cinema, a reversal of the increasingly apathetic and pessimistic portrayals dating from the 1960s forward. According to Sobchack, the first Golden Age, gaining lustre throughout the 1950s, was characterized by its "symbolic representation of the new intersections of science, technology, and multinational capitalism whose most visible signposts were the atomic and hydrogen bomb and the electronics of television" (299). These early films dramatized the newness of those intersections, and, to use Jamesonian language, cognitively mapped viewers' locations within them, emphasizing "the fearsome and wondrous *novelty* and *strangeness* of this new technology—and on the new forms of cultural *alien-ation* generated by this technology and its entailment with a whole new economic world system'" (Sobchack 252; emphasis in the original). The discourse of novelty and wonder returns with the 'personal computer' in the 1980s. This shift in representation plays out at the thematic level: through the decade, the personal computer begins to play the part of hero, or sidekick, or tool, where in its earlier manifestation as 'computer' it had been cast as the villain. Such recasting is not without precedent. This thematic shift is similar to the one played out early in the twentieth century, in which the Victorian detestation of ugly, noisy, and generally horrific nineteenth-century machines wreaking havoc on the physical landscape resolved itself into admiration of leaner, cleaner, quieter (less material, it seemed) electrical technologies that could operate with less overt violence in the physical world, and simultaneously extending its reach on the metaphorical level.[7]

The second break is a meta-representational one, in that the cross-fertilization of narrative genres and forms compensates for the incapacity of standard genres and media to adequately narrate this new computer into cultural coherence. This is a more formal break, resulting in either the creation of new literary or representational genres or in the recalculation of the import or role of these genres in public discourse.[8] For example, consider the Apple "1984" ad's reliance on high-literary Orwellian references and German expressionism-inflected film technique to narrate the Macintosh's place in the consumer landscape. The ad is visually and narratively excessive, a mass of powerful images in epic form. It is hysterical in its accumulation and deployment of powerful, culturally-loaded signifiers—Orwell, *Metropolis*, slave narratives, Holocaust-styled imagery, the propagandistic qualities of television—to narrate the introduction of what is meant to be construed as a non-threatening, easy-to-use consumer technology ultimately most widely adopted in the elementary school system, and in the creative cultural industries. This type of rampant cross-fertilization, seen throughout the 1980s, suggests that the sign 'personal computer' is either so empty that one needs the images and languages of multiple imaginative discourses (science fiction, journalism, high literature, etc.) to colour it into life, or so excessive that only repetition, hyperbole, and density of metaphor/description can do it justice—or both.

By mid-decade, the 'personal computer' was not only distinguished from 'the computer,' that remote and sometimes evil behemoth that lived in air-conditioned antiseptic environments, but was subject to a number of variations on itself as well: transforming itself from the latest variant on 'computer' into something fundamentally different, it is hardly surprising that the representation of the personal computer was prone to excess and multiplicity. In some texts, personal computers were characterized as mundane tools of everyday life for many individuals, near-invisible ephemera; in others, the personal computer symbolized the accelerated pace of (post)modern life and work—this mode often marked both machine and user as sexy and cynically cool; in yet another set of narratives, the personal computer was the springboard that would bounce humanity beyond the surly bonds of earth and corporeality, into new bodiless utopias. While the 'personal computer' of the 1980s breaks from popular conceptions of the computers that predate it, it is also seemingly fractured into many different kinds of personal computers, a dizzying array of representations and characterizations that threaten to overwhelm any coherent analysis of the general object in the decade in question. I say 'seemingly' because the apparent cacophony of discourses of personal computing are, in fact, categorizable, and, further, all tend ultimately to the same purpose.

The new 'personal computer,' as much as it works to differentiate itself from all other computer-like machines that came before it, still inherited these machines' representational legacy. The microcomputers depicted in journalism and fiction of the 1980s—that is, the machines making up the category 'personal computer'—are incomprehensible if they are not considered in perspective, against the ground provided by at least a century of literary interpretations of the meaning of high technology in human affairs, most of which centred around the narrated 'computer.' As the 1970s drew to a close, the 'computer' had a fairly poor-to-ambivalent popular reputation, labouring under the weight of a longstanding legacy system that burdened it with excessive signification, most of it negative or hubristic. The 'personal computer' of the early 1980s defines itself through and against the legacy system that informed the popular conception of 'computer,' at once mining and repudiating it—deploying its inherited set-pieces and inherited machines to show *what-it-is-not*. The 'personal computer' promoted by IBM, Apple, and other manufacturers, and narrated in cyberpunk and popular fiction and film all depend on prior representations in order to make sense. Working to deny filiation while drawing on an association to antecedent representations, narratives constructing the personal computer walked a fine line, asserting difference while exploiting sameness. The resulting representations, as a result of this tension, protest too much in the manner of Gertrude to Hamlet: depictions of the new, personal computing tend to excess, providing a multiplicity of narratives often verging on the hysterical, the ridiculous, and the fantastical, and operating on the emotive rather than rational register.

Three modes of representation:

The personal computer comes to be figured in three main ways over the course of the 1980s, ways I have provisionally named *integrationist*, *critical/dystopian*, and *fantastic/utopian*. These modes of representation—sometimes competing, sometimes overlapping—offer frames of legibility through which to read the new 'personal computer' as friend or foe, instrument or agent, tool of liberation or weapon of power. Patricia Warrick, in *The Cybernetic Imagination in Science Fiction*, also employs a tripartite analytical frame to make sense of 'cybernetic' texts similar to the ones I address here. Her model, as I noted in Part I, separates computer- and robot-based science fiction of the mid-twentieth century into the categories of *isolated system*, *closed system*, and *open system*.[9] It is useful here to take a closer look at Warrick's work. The systems model she describes is based on contemporary scientific debates about the best means to describe the organization of animate and inanimate matter. Warrick goes into great detail delineating the debates and shifts in the discourses of science, citing Newton, Heisenberg, Einstein, Norbert Weiner, and others in describing systems theory; her own systems model fits literary narratives to the scientific paradigms from which she draws her categories.

The power of Warrick's model lies in its meta-narrative reading of science fiction: to slot a text into a particular category means addressing the narrative import of its most basic organization. In this way, a given cybernetic text is shown to embody a certain paradigm, to frame the space of narrative as a means of understanding and structuring reality that links the fictional text to other social realities. However well it may work at the highest level of organization, though, the systems model lacks the explanatory power to address the interrelations of imaginary and material computers: it does not allow the relationship of fictional computers to material ones to be analysed in terms of anything other than resemblance. The systems model allows Warrick to diagnose the varying pessimism or optimism of texts according to the system they narrate; it does not allow her or us to see the role of particular computing technologies within these systems, nor to interrogate the mutual influence between the engineered computer and the imaginary one. Warrick takes care to indicate her scientific as well as literary pedigree, and she is concerned with the science of these tales as much as with the fiction: she demonstrates a bias toward the scientifically plausible, and toward the optimistic. Accordingly, Warrick criticizes authors who do not know enough of computer science to reflect the state of the art in their fictions; she also, however, dismisses as unimaginative those writers who 'extrapolate' from current social realities in their fictions, rather than leap to new orbits of reality through the more creative device of 'speculation.'[10] Science fiction relates dynamically to itself, but only ever resembles lived reality without interacting materially with it.[11]

My own model incorporates Warrick's concern with overall narrative structure, but adds a consideration of the changing role of the computer in the texts examined, understanding the powerful sway computing objects exerted in the redefinition of genre and kinds of stories articulated in the 1980s and the kinds of machines and social relations they made possible. The categories are intended to allow for the articulation of shared narrative focus or thrust among texts not normally considered together. As I am trying to show the kinds of work particular narratives perform in constructing a legible 'personal computer' in culture, the pattern I construct from the disparate texts of this chapter is based on the characterization of the machine, on the classes of meaning it is made to bear in the aggregate. The tripartite model I offer here—with the three classes of integrationist, critical/dystopian, and fantastic/utopian representations—allows not only for the identification of patterns among diverging kinds of texts, but for the analysis of a particular pattern as systemic and, thus, consequential more broadly.

Briefly, integrationist works attempt to embed information technology within existing, essentially human-centric, worldviews, portraying computerization as one more step on the path towards attaining the *telos* of humanist history, namely transparent communication and perfect self-unity. Sometimes, less grandly, the computer is depicted as simply another tool in the practices of daily life—a consumer durable, an entertainment unit, a big calculator—a startling change in representational practice from the previous decade. After the fear and loathing that infused representations of the computer from the mid-1960s until the late 1970s, computer technology was radically reframed in the 1980s: it became smaller, and was employed more and more often as a tool of the protagonist and not of the villain. The 'computer,' reconceived as a personal-use technology, was recast beyond science-fiction-thriller, appearing increasingly in romantic comedies, family movies, thrillers, teen flicks, and action films; it was often depicted purely instrumentally, sometimes in the mundane service of advancing an otherwise unwieldy plot or, more often, lending atmosphere and plausibility to the action. For example, the 'personal computer' of *Ferris Bueller's Day Off* (1986) is not your father's computer: Ferris laments receiving the computer rather than a car as a birthday gift from his parents. This complaint reflects more than rapacious teenage desire for *stuff*: it is a complaint underpinned by a new equivalence between the most popular consumer transportation technology ever and an untried machine of unsure purpose. Importantly, too, the new 'personal computer,' Ferris's personal property, is a technology deemed fit for juvenile use, and is integrated into the fabric of daily domestic life. Much of the advertising that pushed the microcomputer from the hobbyist market and into wide-scale use takes a similar tack, and was firmly integrationist in tone: Apple Computer's ads for the Apple II through the late 1970s and early 1980s set the trend for this type of advertising, which IBM's Personal Computer ads followed. These ads re-placed the computer, depicting it in a variety of familiar familial and home office settings, again used by women, children, and be-slippered fathers, working to mitigate the threat of the 1970s-era legacy computer, a machine represented as monolithic and terrifying.

Critical/dystopian texts, on the other hand, represent cutting-edge or as-yet-unengineered computing technology as fundamentally alien, often by fetishizing machines in self-consciously stylized prose or *mises-en-scène*. In their push to depict the brave new world of miniaturized computing as radically anti-human, these narratives resemble the pessimistic films of the 1970s. But critical/dystopian texts of the 1980s distinguish themselves by a novel construction of paranoia as cool, and of dystopia as sexy. Films such as *Escape From New York* (1981) create a new computing aesthetic summed up best (as is often the case) by William Gibson's assertion that "the street finds its own use for things." Critical/dystopian computers are held together with duct tape and are operated in filthy urban jungles by rebellious, street-smart loners working against the 'system.' Works subsumed under this category are the most likely to self-identify as 'postmodern' in terms of subject matter, point-of-view, or style. The British *Max Headroom* television movie (1985), and later and to a lesser extent the 14-episode television series on American network ABC, exemplify a commodified cool dystopia—after all, the 'Max Headroom' character started life as a music video host.[12] Later adopted as a 'spokesman' for Coca-Cola, Max Headroom was meant to evoke the 'new' and the cool, to associate a particular "sugared water" (in Steve Jobs's famous estimation [Freiberger and Swaine 353; Levy, *Insanely Great* 237]) with a cyber-*zeitgeist* that was assumed to be the next big thing. Cyberpunk is the emblematic literary movement of the critical/dystopian tendency, with the set dressing, *mise-en-scène*, and cinematography of Ridley Scott's *Blade Runner* (1982), featuring a haunting electronic score by Vangelis, its filmic apotheosis. The action genre makes the most sustained and commercially mainstream use of the critical/dystopian perspective, notably in films like *Escape From New York* (1981), *Terminator* (1984), and *RoboCop* (1987): the sophistication and centrality to the narrative of the represented computers (personal and otherwise) in these films varies, but in the aggregate they are generically of a piece, using new technologies to set fiction in a plausible dystopian near-future.

Where critical/dystopian narratives posit new technologies as fundamentally alien to human culture, fantastic/utopian texts, conversely, often fetishize computer technology as a form of externalized and idealized Enlightenment rationalism, conceiving of machines and virtual spaces that allow for the final freedom of mind and reason over the hopeless messiness of bodies and lived human relations. Rather than serve the plot instrumentally, the computer of fantastic/utopian narrative offers a privileged mode of being, an example to be followed, or a *deus ex machina*-style resolution of intractable social problems. More theoretical works than fictional narratives manifest this kind of utopian tendency; this mode lends itself especially well to the manifesto genre. Pamela McCorduck's *The Universal Machine: Confessions of a Technological Optimist* (1985) falls into the fantastic/utopian camp; as the book's title suggests, McCorduck proposes better living through computerization. On the fiction side, the emblematic fantastic/utopian text is Disney's *Tron* (1982), more fantastical than utopian, in which the computer operates as the plausible link between the mundane world of real life, and the science fiction utopia just beyond the clouds. In this vein, a sub-genre of personal computing films, the 'videogame movie,' offers its generally poor, young, white male protagonists fantastic escapes from the everyday world via gaming prowess: in *The Last Starfighter* (1984), for example, the titular game turns out to be a training simulator for real intergalactic battle that lifts protagonist Alex from his dead-end job as a trailer-park manager to his destiny as heroic starfighter.

These three categories—integrationist, critical/dystopian, and fantastic/utopian—offer working frames. Many of the texts I am examining, such as the *Time* "Machine of the Year" article, do not fit neatly into one category. Also, there is a great deal of variability within the categories themselves. Each of the three modes can be put to very different uses: Donna Haraway's 1989 "Manifesto for Cyborgs," for example, is as much a fantastic/utopian text as Steven Levy's *Hackers: Heroes of the Computer Revolution* (1984), but each writer offers a very different vision of utopia. Within each broad category, then, widely diverging representations are possible; for instance, I would place *Weird Science* (1985)—a film in which two teenage boys use a home computer to construct a (gorgeous, female) human being from magazine clippings—in the integrationist camp. Although this film clearly does not minimize the tech-ness of the machine, but rather ritualizes and celebrates it more in the style of fantastic/utopian texts, it deploys the computer so off-handedly, so instrumentally, and with so little harmful consequence to its users, that it must be read as integrationist rather than fantastic/utopian. Some texts range across the categories, like *WarGames* (1983) and *Tron,* which double their representations of computers: one particular computer, or one part of a computer, is made to bear one kind of meaning, while another computer or component carries a contradictory meaning. Accordingly, I employ the three categories as broad standards, as classes of cultural stories against which the narrative logic of particular texts can be measured. Neither formally nor thematically complicated or daring as *literary* texts, offering what Scott Bukatman, citing Fredric Jameson, describes in another context as "mere thematic representation," mass-audience representations of computing nevertheless demonstrate the "iconographic force with which these objects have become endowed" because of—rather than despite—their seeming unconcern with computer culture *per se* (49). Such mere thematic representations imbued with aproportional iconographic force comprise the very techniques of persuasive argumentation Kuhn identifies as central to the overthrow of one paradigm for another.

As we have seen in the represented computers of the legacy system, the prevailing mood by the mid-1970s was one of nearly unrelieved pessimism, marked by feelings of individual powerlessness and institutional inaccessibility; such a view of computing was discordant with newly-developed desktop-sized machines designed for individual use. Kuhn articulates his theory with the epistemology of science in mind: in the sense that he develops the concept, paradigm shifts come about as the result of the incommensurability of an existing scientific paradigm (like Newtonian dynamics) and new information (Einsteinian dynamics). Edwards asserts that through the decade, revitalized representations of computing, spurred by the development of the smaller personal-use machines, "diminished the iconographic link between computers and panoptic authority" (340). I argue instead a more substantive change, a *split* rather than a rehabilitation: panoptic authority remains visible and associated with large-scale computing throughout the 1980s—but the 'personal computer' is articulated as a discrete object operating in opposition to this authority. Through the 1980s, the 'computer' and the 'personal computer' come to be construed as radically different objects. This distinction is consequential, as it promotes the "Möbius strip" of apparently contradictory critical opinion that can, like Jean-François Lyotard in *The Postmodern Condition*, promote one kind of computing as a solution to the problems posed by another (Porter 45). The establishment of the 'personal computer' leaves the 'computer' intact as a coherent symbol while articulating a discrete field for itself, to the point that both machines—'computer' and 'personal computer'—could be narratively intelligible as distinct while appearing side by side. In the Macintosh ad, for example, an Orwellian view of computing shares the narrative field with the new personal version: chirpy Mac v. Big Brother.

The sheer unanimity of this assessment of personal computing's 'revolutionary' impact among widely diverging writers begs analysis. Is there a "home computer revolution" as computer proselytizer Ted Nelson suggests in a book of that title in 1977? In Kuhn's model, a new system of knowledge overthrows the old one it contradicts, reconstituting what counts as 'normal science,' the hegemony of practice and belief that circumscribes disciplinary practices in each science. By the end of the decade, 'normal computing' holds two practices in tension: the new personal mode of computing undertaken by individual subjects on desktop machines *and* large-scale bureaucratic, governmental, and institutional computing. Each is meant to check the excesses of the other. Kevin Porter names this tension as twin paths of 'terror' and 'emancipation' characterized, in turn, as "the concern that computers may be the most efficient tool yet of social control, and the hope that computers may actually be personally liberating and potentially subversive" (45). Edwards is partly mystified by the path of emancipation he discerns in the shift from terroristic depictions of computing to liberatory ones, coming as it does in the midst of Reagan-era cold war nuclear hysteria that would seem to feed the former rather than the latter trend. He opines that "a sort of perceptual threshold had been crossed in popular culture," and I believe this is precisely the splitting into two of the prevailing discourse of computing (Edwards 339). Each split half is made to bear conflicting, multiple meanings.

The three modes of representation, we shall see, each work to distinguish 'personal' from other kinds of computing while leaving the prior symbol largely intact as a foil. Such disaffiliation requires narrative violence, excess, and hyperbole, as the Mac ad demonstrates. This trope of excess and hysteria pervades fictional as well as non-fictional texts, speaking to a moment of attempted transformation whereby personal computing is proposed as the solution to (and sometimes emblem of) deep-seated cultural anxiety and desire. To anticipate the argument of the following chapters, the three modes of representation addressed here are keyed to particular concerns. Integrationist texts narrate a renewed fantasy of upward social and economic mobility, with personal computers standing in as index of sure success. The next chapter, "You've Just Run Out of Excuses for Not Owning an Personal Computer," examines a variety of advertising and popular cinematic texts to demonstrate how new forms of computer use—and new computing objects—seek to minimize the legacy association of computing with personal disempowerment, reconfiguring machines and practices as fun, simple, and necessary to personal success in the latest iteration of the (technological) American Dream. Critical/dystopian works, for their part, operate much more on the negative register, embodying at once fear of The Bomb and the threat of nuclear annihilation that inheres in legacy computers and which suffuses Reagan-era politics and culture, and propose individual survivalist responses to technological postmodern warfare in new "personal" kinds of computing. This largely aesthetic process is described in the chapter "The Sky Was the Colour of Television" which draws its title from Gibson's iconic *Neuromancer* (1), reading how the Hollywood action genre is reconfigured for the new computer age, inflected by cyberpunk's style and narrative focus. The final chapter of this section, "Why 1984 Won't Be Like Nineteen Eighty-Four," examines fantastic/utopian narratives, which for all their new computing trappings, evince a strong nostalgic longing: for faith in scientific rationalism, for a simpler time. In his study of cybernetic fiction leading up to the 1980s, David Porush asserts that "[t]hough the complexity of the machines that inspire our metaphors has grown, the literary uses to which these metaphors are put remain essentially the same" (7). Not so; and the three classes of narrative demonstrate how this earlier essential sameness is fractured, as we will see in the coming three chapters.

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[1] I refer to the microcomputer and the personal computer as if they were objects discrete from one another—this is done for the purposes of articulating an argument. At base, the distinction is momentarily helpful but ultimately spurious.

[2] A modifier like 'staggering,' or 'stunning' in the next sentence, or 'obviously' throughout is a dangerous thing to deploy when describing technological invention or innovation. Clearly the staggeringness or obviousness of any particular technological change is dependent on one's position in relation to that technology. For example, the Macintosh interface is no great surprise to Douglas Engelbart, who first developed mouse-and-windows technology in the late 1960s as a researcher at SAIL; nor is it unfamiliar to the researchers at Xerox PARC, from whom the Mac developers borrowed directly. As elsewhere, I am here basing the subjective aspects of my assessment on a reconstructed Joe Turkey User perspective: what might have been the reaction of a non-expert to the technology in question? This non-expert through whose perspective I aim to filter my own understanding of the progress of the personal computer is, of course, a fictitious and composite subject. This composite subject is best-guess perspective that I reconstruct from various sources: the implied subject of address in beginner texts of the decade in question, of product reviews and other informative technical writing; a subject triangulated from survey results from the period; the subject of address in movies and movie reviews, etc.

[3] The care of the Macintosh's design as industrial product is related by Steven Levy, who notes two design imperatives for the new machine: "First, it had to be a physical statement that this computer, unlike any that came before it, was easy enough for anyone to use—fun, even. And second, perhaps even more dear to Jobs's heart, the Macintosh had to be a gorgeous object in and of itself" (*Insanely Great* 138).

[4] Steven Levy offers the association of the Macintosh graphic to Picasso's style of drawing (*Insanely Great* 179).

[5] In his reading of *Technology and Culture*, Staudenmeier see this question broached along two main fronts, through an examination of the processes of emerging technology—cycles of 'invention,' 'development,' and 'innovation'—and via analysis of what Staudenmeier terms 'ambience issues,' consisting of synchronic, diachronic, and systemic factors supporting or hindering any particular development path (39).

[6] Sobchack's change in focus is reflected in the structure of her book, the original edition of which is a generic study in three chapters. The fourth chapter, written nearly ten years after the rest for publication in the second edition of 1987, draws heavily on Fredric Jameson's essay "Postmodernism, or, the Cultural Logic of Late Capital" to embed what Sobchack sees as the beginning of the 'second Golden Age' of science fiction film in the context of the broader cultural movements of postmodernity writ larger.

[7] In separate studies, Steven Levy (*Insanely Great*) and David Gelertner (*Machine Beauty*) advance the same provocative hypothesis that ugliness, noise, and inelegance are seen by some as desirable qualities in machines generally and computing technologies specifically: such qualities speak to the 'hard-work' performed, as well as to its 'manliness.' We will return to this hypothesis later, in the chapter on fantastic/utopian texts.

[8] Obviously, genre-blending is not unique to popular discourses of computing. It would be rash for me to claim that such blending is inaugurated at this time and in these ways—what I mean to stress is the newness of the genre-blending to particularly computer-inflected narratives.

[9] In brief, isolated systems, sub-units of a larger reality, operate like a tempest in a teacup: they are self-contained, subject to internal rules, and isolated from reality-at-large. Closed systems, whose definition owes much to Newton's observations on the behaviour of inanimate matter, and to the laws of thermodynamics thus discerned, are characterized as tending towards entropy, again self-contained. Open systems, the most recent of the categories to be articulated, demonstrate a tendency to greater organization, in contrast, evincing an optimism about science generally through the promotion of space travel, exploration, and colonization.

[10] At base, Warrick's analysis is structured by her personal preference for 'hard science fiction' featuring plausible science and implausible societies. More troubling are the imperialist overtones

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present in the open-system narratives she prizes: basically, such stories transcend the current social ills (political, environmental, social) in a colonizing rush into outer space.

[11] While it may be Warrick's purpose to apply scientific paradigms to literature, it is not mine; however, my own enterprise is immeasurably helped by Warrick's careful collection and thoughtful reading of computer-like texts of the twentieth century.

[12] Interestingly, the stuttering, glossy, computerish effects achieved in the 'Max' scenes were achieved through old-fashioned methods: actor Matt Freuer wore a prosthetic over his hair, and the choppiness was achieved through careful film splicing.

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You've Just Run Out of Excuses for Not Owning a Personal Computer

The term 'integrationist' has strong associations with the American civil rights movement, but at its most general, the adjective describes the interpolation of one element into or between others. Integrationist representations of the 'personal computer,' then, interpolate microcomputing machines into the existing cultural milieu—essentially fitting the computer to culture, rather than the other way around. The integrationist presentation of the personal computer often minimizes the effects of its strangeness and its 'tech'-ness, emphasizing instead a competing vision of the new machine's unique capacity as a time-saving instrument in the service of recognizable and 'traditional' human subjects pursuing similarly well-established purposes. In fictional texts, such purposes include the pursuit and attainment of true love, the entrapment and punishment of evil-doers, and the rise to prominence of the deserving but overlooked, for example. In non-fictional texts such as computer company press releases, advertisements, and user manuals, the banality and instrumentality of the machine is emphasized, and the computer's power is quite literally domesticated in the service of tracking "cooking recipes" while nevertheless being simultaneously promoted for its business applications such as "stock analysis" ("Personal Computer Announced by IBM"). In these texts, the computer operates instrumentally, extending the sphere of individual accomplishment, thus integrating computer use into particularly Western ideologies of individualism and personal advancement.

Certain representational motifs identify particularly integrationist texts. Ultimately, the depicted computer is physically and symbolically less grand than the computers of earlier modes of representation: it is less likely to be anthropomorphized; it is more likely to be seamlessly or invisibly interwoven in recognizably 'human' and 'normal' *mises-en-scène*; in fiction, it is more likely to consist of existing rather than imagined computers; in non-fiction, it is less likely to reference popular fictional representations of supercomputers like *2001: A Space Odyssey*'s HAL 9000. Rather than figure alienation of human subjects from the increasingly technologized worlds they inhabit, these representations interpellate (in the Althusserian sense) human subjects into new kinds of un-alientated computing. Integrationist texts respond to the threats posed by the legacy computer to the workplace, to subjectivity, and to family life by proposing computing machines and practices that support and re-entrench these threatened spaces and relations. In fiction and non-fiction texts alike, the personal computer is rhetorically enmeshed in familiar social relations and social spaces, via stereotypical depictions of family-, gender-, and work relations that comprise the established postwar ideal of American Everyday Life: an upward socioeconomic mobility within static sociopolitical structures. Using a computer was like typing a letter only better, like having a recipe box but more powerful, like owning a television except more interactive: the personal computer was powerful and it was easy to use. Such an apparently contradictory dual claim was communicated in machine design and advertising which exploited existing gender and class associations to minimize the alienation and threat of computing on the one hand, while simultaneously describing power and social mobility on the other. Such embeddings are not seamless, nor is the blend of domesticity and power associated to the machine without its constitutive contradictions, as will become evident. This chapter begins by examining computer advertising texts—for the Apple II, the IBM Personal Computer, and a range of others—to demonstrate how non-fictional integrationist texts deploy fundamentally conservative social narratives of 'family values,' meritocratic economic advancement, and established gender roles to integrate new computing technologies into the known, and to refigure computing machines as mass-market consumer durables. Next, a reading of fictional integrationist tests will show how a wider range of possible machines and machine-users are represented in two main narrative spaces—the home and the workplace. Ultimately though, these texts too are socially conservative and work to minimize the residual threat proposed by legacy representations by recourse to established value systems prizing individualism and a particularly American brand of 'free-thinking.'

Your Own Personal Computer. Imagine That

Computer advertising exhibits particularly strong integrationist tendencies: trying to sell the new machines to new markets, advertising texts worked most baldly to forge or force an identification between individual consumers and new computing machines and practices, to hail the new computing subject. As James Twitchell notes in the introduction to his *Twenty Ads that Shook the World*, "[w]hat we really crave is not just material, but material with meaning," and that "advertising is at the heart" of the process of meaning-making in the consumer marketplace (10). These advertising texts, additionally, usefully indicate the technological state of the art, providing a baseline of computing against which we can understand the claims made in other texts. Integrationist advertisements posit a much more intimate and personal relationship between computing machines and the lay public than had previously been the norm, asking this public to invite computers into the home as well as the workplace, to imagine one's life with computers integrated into it.[1] To this purpose, probably the most notable innovation creditable to marketing efforts was the renaming of the 'microcomputer' as the 'personal computer.' *Time*'s "Machine of the Year" article acknowledges the importance of the nomenclature issue, when it juxtaposes, if it does not explicitly link, the naming of the technology and the uses to which it will be put:

> How society uses its computers depends greatly on what kind of computers are made and sold, and that depends, in turn, on an industry in a state of chaotic growth. Even the name of the product is a matter of debate: "microcomputer" sounds too technical, but "home computer" does not fit an office machine. "Desktop" sounds awkward, and "personal computer" is at best a compromise. (Friedrich)

While in the early twenty-first century we refer to the progeny of the early microcomputers as either computers *tout court*, or, distinguishing by portability or operating system, as laptops or desktops, or as 'Windows boxes,' 'PCs,' or 'Macs,' in the late 1970s and early 1980s, there was no standard nomenclature, no easy shorthand by which to refer to microcomputing machines.

BYTE Magazine claims credit for coining the term 'personal computer' in 1977, but at that time 'microcomputer' and reference by brand name was just as common (Langa). Apple Computer also has a credible claim on the moniker 'personal computer,' or at least bears some responsibility for popularizing the term;

the company also starts using the term 'personal computer' as well as 'home computer' with the launch of the Apple II in 1977. Before the hegemony of the term 'personal computer,' two main naming standards identified the new machine: reference by (specific) brand name, or reference by (general) technological lineage. Neither practice could really distinguish microcomputer objects as fundamentally new, nor could they describe new human relations to the machine. Referring to a computer by its brand name does little to indicate a machine's place in culture—that these brand names, further, featured unmelliflous all-caps, numbered acronyms like IMSAI and TRS-80 did not make them any more consumer-friendly, either.[2] Identification by brand name, then, is a non-starter in the bid to reconfigure the computer's place in consumer society; if anything, this practice extends legacy assocations to the new class of machine, with its evocation of earlier acronyms and of numeracy—the fictional EMERAC of *Desk Set*, for example. The more general designation 'microcomputer,' also, relates the new kind of computer to those which came before it: first there were 'computers' like ENIAC, which were very big; then, newer, smaller machines such as those made by Digital Equipment Corporation (DEC) garnered the name 'mini-computers' by dint of their size relative to the industry standard and their lesser computational power. The 'microcomputer' was the most recent and smallest of all—the newest member of a family of ill public repute. If 'computers' and 'mini-computers' were the province of hackers, engineers, and priests, and the 'microcomputer' reified its filiation to these machines in its very name, then this new kind of computer inherits the same modes of representation which we have seen above to plague the older machines. Clearly, the designation 'microcomputer' does not immediately indicate a radical break in function, nor is it obvious in the neologism that the microcomputer is "a computer for the rest of us."

The decisive break between the new machine and its predecessor becomes apparent when the microcomputer is re-named 'personal computer,' when it is marketed to 'the rest of us,' and when the advertisements designed to sell it attempt to construct consumer desire rather than to reflect the machine's quantifiable computational capacities. Integrationist tendencies were well-established at Apple, which company may be said to have invented this advertising angle in its very first machine-design, and, indeed, offers us the "computer for the rest of us" ad. IBM, naming its inaugural mass market, small-scale computing machine the 'Personal Computer' in 1981, marks the apotheosis of this trend. By the later 1970s, after the success of the MITS Altair, advertisements for personal computers began appearing in popular rather than specialist venues.[3] Early advertising campaigns for the Apple II series of computers (1977-) and the IBM Personal Computer (1981-) set the trend for de-technologizing popular conceptions of the machine; the notable exception to this trend is, of course, the "1984" event ad for the Macintosh. However, after its splashy fantastic/utopian debut campaign, the Macintosh, too, would eventually be advertised with the solidly integrationist tagline "A computer for the rest of us." Apple II designer Stephen Wozniak firmly believed that computing was meant to be a tool of individual use, writing in his system description of that machine for *BYTE Magazine* that "to me, a personal computer should be small, reliable, convenient to use, and inexpensive" (Wozniak).[4] But it is Apple co-founder Steve Jobs who zealously sought to reconfigure the image of computing through deliberate consumer-directed marketing tactics and design imperatives. By 1977, Apple had already seized upon a (professionally designed) disarming corporate logo: both the striped, multicolored, bitten-apple graphic, and any large red apple generally came to stand in for its machines: contrast this to IBM's company logo, the famously harsh, striped, acronym appearing in all-caps, suggesting, according to its designer, "speed and dynamism" but generally calling to mind a weighty corporate presence (IBM "From Globes to Stripes").[•]

The Apple II

In April of 1977, Apple introduced the Apple II, its first commercial product and its first runaway hit. Many a North American's first experience of personal computing is on this machine and its successors—the Apple II+ (1979), the Apple IIe (1983) and the Apple IIc Plus (1988). The Apple II and its descendents were phenomenally successful, and continued to be sold and supported by Apple until 1993. The Apple II is distinguished from the original, prototype-only Apple I only in terms of packaging and marketing: it is essentially the same machine that Steve

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[•] http://www-1.ibm.com/ibm/history/exhibits/logo/logo_8.html

Wozniak was selling to members of the Homebrew Club, an avid assortment of Bay-area California hardware hackers who met to exchange parts and ideas. But this packaging and marketing altered the Apple I into the Apple II boosted the computer from the orbit of hobby-ism to the hyperspace of the wider consumer universe. This packaging consisted of the design and construction of the computer-object itself, as well as the more ephemeral marketing and public relations campaigns which undertook to construct the Apple as an essentially, deliberately, personal computer. These seemingly less-essential innovations of marketing and design were the hooks that caught consumers, and convinced them to purchase machines: the packaging of the Apple II reconfigured the personal computer as a standard and standardized manufactured consumer good like any other (a toaster, in Jobs's famous quip), and its marketing integrated computing and computers into established patterns of behaviour. Virtuoso designer Wozniak "cheerfully admitted that he didn't care whether or not wires were left dangling out of it" (Frieberger and Swaine 277). Campbell-Kelly and Aspray thus highlight the role the 'other Steve'—that is, Jobs—played in the machine's success. They write that, no technical guru, it was nevertheless Jobs who "recognized before most [in the industry], however, that the microcomputer had the potential to be a consumer product for a much broader market *if it were appropriately packaged*" (246; italics mine). According to the head of Apple's first public relations firm, Regis McKenna, Jobs' attention to just these seeming inessentials pushed Apple into the mainstream. McKenna asserts that "that machine would be sitting in hobby shops today were it not for Steve Jobs" (qtd in Frieberger and Swaine 275).

Apple incorporated in 1976 (on April Fool's Day, still demonstrating some of the Steves's animating whimsy) and established its 'campus' in an industrial park in Cupertino, California. It hired actual marketing firms to promote its new product. And it took care to package it attractively. As a purveyor of mainstream goods, Apple "did almost everything right" according to a *Time* article of early 1982: Apple's first consumer product was fit "into a trim, spiffy model," for which "clear, considerate instruction manuals" were provided, niceties "that made the machine easy for consumers to use" ("The Seeds of Success").[5] Apple clearly succeeded in pitching its computer as a mass market product: notice that *Time* describes the computing subjects as "consumers" rather than "users"—in a market-based capitalist society, such a designation is the most general category of all, indicating *Time*'s belief in the mass appeal of the machine. The article further stresses the role that Jobs, never considered a true hacker, played in trying to make the machine attractive, repackaging it in a custom and integrated molded plastic casing that gave a certain 'look' to the brand. This packaging also had the consequence of effectively hiding the computer as computer.

Apple's strategy was successful at spurring sales. In the fiscal year ending 1979, the company sold 35,000 Apple IIs; the following fiscal year saw 78,000 sales. The machine's sales continued to grow exponentially through the early 1980s: by late 1982, a total of 750,000 Apple IIs had been sold. As of the beginning of that year, 15,000 Apple IIs were being shipped every month (*Time* "The Seeds of Success"). The next year, the millionth Apple II was manufactured (and, presumably, sold). The second million were produced by November 1984—that is, in about a third of the time it took to manufacture and sell the first million machines.[†] Certainly, sales would never have continued to climb had Apple produced a shoddy machine. Indeed, the robustness and power of the Apple II were essential factors in its popular success, as was its relatively immediate usability and ease of operation. Most obviously, the Apple II surpassed other machines by supporting keyboard input and video output out-of-the-box, a real advance over the lights-and-toggle-switch I/O of its contempororaries.[6] Some of the 'computers' against which Apple competed for customers were simply circuit boards with no housing at all, let alone native input and output devices.[7] These bundling and input/output innovations have been described as "a breakthrough in user-friendly."[‡] Add to this the machine's fundamental elegance, utility, and stability compared to other contemporary machines and you go a long way toward explaining the Apple II's phenomenal success. But a large part was also played by careful, novel marketing, where the company was no less innovative and canny: Apple's very first print ad ran in *Playboy*. Certainly, such a placement was an act of bravado on the part of a company not known for its reverence of the established way of doing things, an attention-seeking gesture. But it also indicates Apple's desire to brand its machine as a status symbol, an object of consumer desire equivalent to the fast cars and other 'guy toys' advertised in this macho magazine.

[†] http://www.oldcomputers.net/appleii.html

[‡] http://www.oldcomputers.net/appleii.html

Apple's initial brochures for the launch of its first mass market machine featured a strikingly simple image, very little text—and no computer. Against a white ground, a red Macintosh apple occupies the centre of the frame. The caption below the graphic reads "Introducing the Apple II, the personal computer." What is most striking of all is the predominance of white space in the composition, the quality of the photograph and reproduction, and the elegance of the typeface. This type of advertising was uncommon at the time: most ads appearing in periodicals such as *BYTE* were visually cluttered, and generally depicted unimaginatively photographed computer components ranging from monitors to circuit boards—often not to scale and mostly without context, or ground—arrayed across a depthless field. Science fiction and space themes were often exploited, with many ads featuring intergalactic background vistas or starburst photography against which marketed components floated. Further, most computer ads of this period were littered with vast swaths of technical text, and manifested little of the design sophistication associated with ads promoting more traditional or established consumer goods. Such computer or component ads are clearly targeted at a hobbyist or expert audience of savvy buyers, a different demographic than Apple aimed for. To this group, the straight goods—depictions of circuit boards, cables, storage media—were legible and carried meaning. To show the article for sale helped explicate its use value. Apple targeted a general, inexpert audience. Notably, the Apple II is introduced *in absentia*: it is not even depicted on the brochure's cover. However, the simplicity of the graphic design draws a powerful iconic link between the depicted apple and the company's product, which establishes Apple as a brand.[8] The care and obvious elegance of the visual design of the brochure helps establish the class position of the machine and its owners: it's far less pocket and much more mid-sized sedan than other contemporary computer advertisements. The differentiation of the Apple II from other computers, and the association of its advertisements with the campaigns promoting more traditional middle-class goods immediately makes the promoted computer appear to be a much less threatening machine, and a much attractive consumer good, than the computers which had come before it.

Other inaugural ads for the Apple II claim that "Simplicity is the ultimate sophistication" and "Sophisticated design makes it simple," attempting perhaps to quell consumer panic about the complications of computing such as were depicted in the banks of switches and *blinkenlights* seen in the computer movies of the previous decade, or indeed in most other contemporary computer advertisements, while nevertheless asserting its computer's power.[9] The potential to read such a claim as inherently contradictory or paradoxical is mitigated by carefully doubled, gendered representations. Careful manipulation and control of the visual and textual fields offers a text that narrates a coherent vision of personal computing, one which promotes ease of use and power of application at one and the same time. Specifically, the machine's threat to established practices is minimized by a feminization that sees the computing *machine* itself depicted as an object of (consumer) desire and placed into domestic spaces coded as feminine. Computing *practices* are then re-masculinized, to demonstrate the power that the computing subject asserts over the machine as well as over processed data. The Apple II's first mass market print advertisement, a two-page full-colour magazine spread, is taken up by a photograph on the left, and by text-and-photographs on the right.[§] On the left, the personal-use Apple II is depicted in a clearly domestic setting, while maintaining a foot in the business door as well. This main image, with the caption "Introducing Apple II," shows a man working on his Apple II at the kitchen table in the foreground. He has a cup of coffee at hand; the computer's colour display shows a line graph. In the background, a smiling woman looks over her shoulder at the man approvingly while she washes the dishes. Beyond her we see a framed photograph of the more iconic Apple brochure, the Macintosh apple on white ground, minus the text: the apple/Apple is thus enmeshed in the practices and spaces of the home.

This domestic theme appears again almost exactly in a Radio Shack ad for its own personal computing line, the TRS-80 series of machines: in this case, the ad photograph, reproduced as the cover of 1978's *The Home Computer Handbook*, enriches the familial and domestic associations with the addition of children to the scene (Schlossberg, Brockman, and Horton). 'Dad' is still in the foreground at the computer, with his coffee, and 'Mom' stands behind a kitchen island, looking on, smiling, and stirring something in a *le Creuset* pot (bespeaking certain middle class affiliations). The children peer at the screen with smiles on their faces. It is perhaps to this powerful visual composition that we owe most early personal computers' advertising invocations to track and store recipes on the machine. This main computer-in-the-kitchen theme literally domesticates the computer, firmly embedding it in the 'homiest' space of all, the family kitchen: this image forcefully opposes the public perception of the computer as remote, sanitized, and tended by experts, and consequently of computing as a matter of high seriousness. Nevertheless, within this domestic space, a male subject performs what look to be mathematical operations on the machine, perpetuating legacy modes of representation such as are manifest in the *Time* "The Computer in Society" cover of April 1965. At base, the scene places the Apple II in an unthreatening space meant to minimize the estrangement from computing potential buyers inherit from the legacy system, while still demonstrating the computational power of the machine *qua* computer.

[§] http://www.kelleyad.com/histry.htm

The right hand side of the Apple II ad ran at least two different ways; both versions counterbalance the domesticity and strong feminization of the machine's context in the left-hand, pictorial half of the ad. Each version of this right-hand panel had a headline and divided the page between columns of text and images of the computer in use, of computer components, and of the Apple corporate logo. Manifesting the indecision between the terms 'home computer' and 'personal computer,' one ad's headline reads "The home computer that's ready to work, play and grow with you," while the other claims "You've just run out of excuses for not owning a personal computer." This equivocation of terminology reflects a certain softness in the nomenclature of the period, as the machine is alternately referred to throughout Apple promotions as either a 'personal computer' or a 'home computer.' The former term speaks to the role of the computing subject, linking computing power to an individual agent, while the second describes its location, a consumer good located within a feminized, nonthreatening domestic space. Indeed, the term 'home computer' did enjoy some popularity in the late 1970s and early 1980s, but its emphasis on the *space* of use, rather than on the individualized *nature* of use made it too specific a name to bear the various meanings that came to be associated with it: a *personal* computer could indeed be imagined to track recipes as well as financial statements, but it is difficult to conceive a *home* computer being an appropriate productivity tool in a small or mid-sized business, let alone a large corporation. The text and images of this half of the ad, though, seem to emphasize the more business-oriented aspects of the Apple II, and represent the computer in ways more in keeping with a masculinized consumer desire for sleek and powerful machines.[10] The computer on this portion of the spread is photographed without a context, placed on a white ground bereft the peripherals that make it a useful object: shot on a wide-angle diagonal, from above, this depiction stresses the sleekness of the machine as a product of industrial design. In the absence of power cords and a display device, we are not meant to imagine using the machine in this image, we are meant to behold it. We are meant to desire it. Other images on the page reintegrate the split representation, however: we see a man and a woman engaged in conversation across an Apple II (the ubiquitous coffee cup and snack apple appear here as well). Such an image blends the domestic and feminized elements—the food, the woman—with the more powerful and masculinized elements—the sleek machine, performing calculations at the behest of a suited man.

The personal computer must divest itself of legacy associations before it can be legible as a non-threatening-but-powerful individual-use technology. Yet another two-page spread for the Apple II, headlined "Sophisticated design makes it simple," emphasizes the new role the machines are to play, their difference from what people might understand computers to be. But it can't be too simplified, not a 'toy.' The risk of seeming to promote a hobby or toy computer is a particular risk for Apple, a brand new company run by very young and very scruffy utopian-promoting men. In 1977, Apple is still targeting a fairly small audience. Its ads therefore speak to a market that knows or suspects it may want a sole-use computer, but does not know what to choose, while acknowledging that computing's reputation needs amerilioration. The first paragraph reads:

> Apple II will change the way you think about computers. Compared to first-generation "hobby" computers, Apple II is easier to use, faster, smaller and more powerful. It brings to personal computing a new level of simplicity through hardware and software sophistication. Apple II can grow with you as your skill and experience with computers grows.

The rest of the ad outlines the technical specs of the machine—hardware and software—in greater detail, in keeping with standard practice of the time. This opening paragraph, though, sets this machine apart, distinguishing it from scare-quoted "hobby computers," and stressing its smaller size and its ease of use alongside more common claims of greater speed and power. Such a clear denunciation of "hobby" computers is a classed gesture as well: the visual difference of the Apple ads from its contemporaries promoting similar machines bespeaks an affiliation to similar glossy ads for established consumer durables like stereos and televisions, and a disaffiliation from the amateurish hobby computer industry. In some ways, these ads deploy good taste as a means of integrating the new machine into established consumption and leisure patterns.[11]

In any event, the sales of the Apple II spurred the company's early-won dominance in the personal computing market. *Time* magazine reported in 1982 that Apple's sales would reach a projected $600 million for that year. *Time* details the exponential growth in Apple's revenue over its five year history, from $2.7 million dollars in sales in 1977, to $200 million in 1980: this astonishing growth fuelled the company's leap onto the Fortune 500 soon after its initial public offering in late 1980 ("Seeds of Success"). Apple's marketing and design was not just financially lucrative for the company—it also helped to establish a gold standard of representation , firmly enmeshing the computer in the home. Circa 1984, seven years after the introduction of the Apple II, the personal computer is more tightly integrated into the domestic space. A two-page ad for the Apple IIc shows "Why every kid should have an Apple after school."[12] Not only is the Apple the most popular school machine, with the largest software library, it also fits into (sterotyped) teen life. More than two thirds of the space of the spread is taken up by a photograph of what readers understand to be a teenager's bedroom. The space is horrendously cluttered: telephone, bubble gum, school books, notepads, a hamster cage and goldfish bowl, model cars, a BMX bike helmet, rock stickers (for Mötley Crüe, no less), cookies, milk—and an Apple Computer. The fit is now seamless: "while your children's shoe size and appetites grow at an alarming rate, there's one thing you know can keep up with them. Their Apple IIc."[13] We can only assume this ad was running in more and different magazines than *Playboy*.

IBM PC

IBM's campaign to launch their "Personal Computer" four years after the Apple II was similarly integrationist.[14] Each company, though, works against quite particular obstacles, and so, while they share the common goal of integrating the personal computer into the established consumer landscape, their paths to this destination begin from different starting lines. With its garage pedigree and hippie reputation, Apple was an unproven upstart—part of its battle to position its microcomputing machine as a consumer 'personal computer' thus entailed divesting itself of the taint of geeky hobbyism. IBM has the opposite problem: a long-established computer industry leader—recall that IBM gets a credit in the opening titles of *Desk Set*, and that the giant EMERAC computer in that film is linked to IBM's 'electronic brain' machines—this company had to reconfigure itself as a purveyor of small-scale goods to individual rather than corporate buyers. 'IBM,' after all, stands for 'International Business Machines Corporation,' an acronym in which two of three key terms would seem to preclude domestic consumer sales. The company's logo, too, trails associations deliberately inimical to the new kinds of computing and computers being promoted. According to Scott Bukatman, designer Paul Rand's 1960 logo for IBM inaugurates an entire genre of massive, awe-inspiring corporate logos, whose "stark geometric forms have beome increasingly synonymous with a powerful corporate identity"—the logos are "monolithic and unrevealing," an association that extends to the corporations they emblazon (33).[15] IBM, that is, labours under a corporate and representational legacy system of its own that it must battle to promote its personal-use microcomputer. Like Apple, IBM positions its new machine as a 'personal computer' via advertising narratives that minimize the machine's threat to established orders while demonstrating its capacities to extend personal agency, via careful machine design meant to render the computer object as transparent as possible so that computing practices seemed to be 'friction free,' and via a reconfiguration of its own corporate practices to become more flexible, open, and timely to meet the needs of a changeable and broad consumer market.

If Apple happened upon a disarming and friendly logo to define its ethos as a company oriented toward the individual consumer/user, IBM had to direct its efforts to prescribing the character of a particular machine. Its corporate clout and international name-recognition as well as its deep pockets worked for rather than against the company in this project. In 1981, the choice of "Personal Computer" as the name for the new IBM machine was an especially canny marketing ploy, designed to associate the new kind of computer with a particular brand—as Frieberger and Swaine note, "[b]y naming its machine the Personal Computer, [IBM] suggested this device was the only personal computer"—but it also helped to domesticate the microcomputer in a much broader way (345). First, IBM brought the machine firmly down to human scale by nominating it as a 'personal' technology, mitigating the effects of the company's own carefully cultivated reputation as a purveyor of 'International Business Machines.' Second, this naming clearly indicated the intended purpose of the machine: a personal computer is, one intuits, intended for use by one person, in marked contrast to the rest of Big Blue's line of computers.[16] This association is significant. We have seen how Apple exploited the terms 'personal computer' and 'home computer' not merely to distinguish its new products from these older, established kinds of computers, but also to domesticate the machine and individualize its user as a powerful computing agent. Well aware of its public reputation as a maker of big, complex, expensive computers for the corporate sector, IBM licensed the image of the Charlie Chaplin tramp 'Everyman,' who could be seen to use the new Personal Computer in televised ads.[17] Rewriting the Tramp's submission to and digestion by the monstrous industrial machine of *Modern Times*, in these ads, the iconic Everyman now controls the computer. In a neat twist, IBM repositions and recharacterizes itself from being the (corporate) machine that oppresses, to being the little guy who explores the machine that empowers.

The creation of IBM Personal Computer heralded other innovations for the well-established corporation: in creating the Personal Computer, IBM altered its established development processes, its sales practices, and its sense of the appropriate market for computing products. An exhibit in the IBM online corporate archives makes clear the break in practice represented by the development of the Personal Computer. *Before the Beginning: Ancestors of the IBM Personal Computer* opens with biblical sweep: "In the beginning, there was the IBM Personal Computer."[**] This statement is deliberately aggrandized for comic effect: underneath the subsequent image of the machine is the caption, "Well, not really."[18] Retraction notwithstanding, the initial claim suggesting that the Personal Computer is the beginning rather than the end of the story neatly excises the machine from IBM's larger corporate history, and proposes the Personal Computer as (once more) the fundamentally new, the inaugural, the different. But the exhibit does, finally, detail prior machines. It is useful to consider them here. IBM's experiments in smaller, cheaper, more individualized computing prior to the development of the Personal Computer speak volumes about the scale of change in the industry as the 1970s waned. Its first single-user computer was developed as a prototype named 'SCAMP'[19] in 1973.[††] It was not a sales success (Ceruzzi 233). SCAMP was redeveloped as the IBM Portable Computer of 1975; this incarnation, which sold for around $9000 (nearly $25,000 in today's currency), earned "modest but steady" sales (Ceruzzi 248). In addition to being expensive—especially when compared to a computer like the Altair, which sold as a kit for $400—the Portable Computer had no real application software, and, Paul Cerruzi notes, "the third-party support community that grew up around the Altair failed to materialize for the 5100 [Portable Computer]" (248). Out of the financial reach of a rabid amateur or entrepreneurial software development community (i.e., hackers) and burdened by a lack of software, the Portable Computer was neither useful enough to warrant corporate purchase, nor cheap enough to attract the hobbyist market.

[**] http://www-1.ibm.com/ibm/history/exhibits/pc/pc_1.html
[††] http://www-1.ibm.com/ibm/history/exhibits/pc/pc_1.html

Four years later, in November of 1979, IBM launched the 5220 Administrative System. This machine was designed to "increase office productivity by combining advanced text processing and electronic document distribution," according to the IBM archives.‡‡ That is, it was a smart typewriter, one of a new breed of single-purpose word processing machines with limited computational power. It was expensive, and operated as a 'smart terminal' system: individual input/output devices hooked into a central machine that supplied the 'brainpower.' It's difficult to triangulate a single-machine selling price from IBM's data: the 5220 came in four different models and was available in any number of combinations of "display stations," storage and processing units, printers, and other peripherals.[20] Model configurations listed by IBM, with five and 15 workstations respectively, sold for between $64,000 and $176,000, or could be leased for between $1,900 and $5,400 per month. These are not insubstantial sums, and they create a bar to ownership for all but established business operations. And who would want to buy it? The 5220 is clearly a business machine, and a mundane kind of business machine at that. An IBM promotional photo of the time shows a wide shot of a 5220-powered office: in the foreground a woman keys text into the machine that she reads from a suspended sheet of paper. Off to one side another woman seated in front of a terminal watches as a man gestures at a sheet of paper. Further back, another woman sits at a third terminal. The central computing unit of the system occupies the middle rear of the frame. This tableau hardly suggests that the 5220 is a machine like the Altair, or even the Apple II: the bland corporate scene and the emphasis on a central machine is more Big Blue than hacker chic—and it is more typing pool than either. These scenes are highly gendered, of a piece with most IBM promotional photographs prior to the Personal Computer campaign. Archival photos and ads show remarkable consistency in the kinds of offices and corporate subjects they depict. Generally, in the offerings of the Office Products Division, women type and men dictate: it is clear that computing in the white-collar context is seen as some form of drudge-work enhancer. The associations are clearly feminine, and clerical. If the SCAMP project had produced a dumbed-down computer, by stripping and scaling-down a machine initially devised as a minicomputer, the 5220 Administrative System takes the opposite tack. This project started with a single-use office tool and tried to upgrade it to greater functionality and generality, but fails to rid the machine of its secretarial taint.

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‡‡ http://www-1.ibm.com/ibm/history/exhibits/pc/pc_5.html

Similarly, in June of the following year, the Office Products Division (known internally somewhat more colloquially and derisively as the 'typewriter division') released the Displaywriter, an "easy-to-use, low-cost desktop text processing system."[§§] At once exploiting and repudiating its kinship to the typewriter, the Displaywriter, according to IBM, "was not your father's Selectric." Neither was it your father's 5220: the Displaywriter could operate as a standalone computing machine, and its basic saleable unit consisted of a monitor, a processor, a diskette drive, a "typewriter-like keyboard" and a printer sold for $7,895, a fraction of the cost of the 5220. The lower cost of ownership, the emphasis on single-user desktop work, and the promotion of its ease of use begin to align the Displaywriter with the developing world of personal computing. But the machine has only a single-purpose: like the Administrative System 5220 before it, the Displaywriter was basically a very expensive typewriter. It was not meant as a general purpose or home use machine. The 5120 Computer System of February 1980 came much closer to the mark: a single integrated box comprising logic unit, disk drive(s), display, keyboard, and BASIC, the 5120 was programmable and multi-purpose. It was still expensive, though, with a "representative configuration" selling for around $13,500 (nearly $35,000 in today's dollars), and a price range spanning from just over $9,000 to nearly $24,000.[***] Available software for the machine, provided as per traditional practice by IBM, addressed general clerical concerns: accounting, payroll, billing, inventory, etc.[†††] The 5120 Computer System may have been an individual-use machine, but it was certainly neither a 'personal' nor a 'home' computer. It seems rather designed for the data entry, payroll, or accounting clerk. These occupations are hardly glamorous. Recall that punched-card tabulating machines were first developed by Herman Hollerith to facilitate the grunt work of collating the US census.

[§§] http://www-1.ibm.com/ibm/history/exhibits/pc/pc_8.html

[***] http://www-1.ibm.com/ibm/history/exhibits/pc/pc_6.html

[†††] http://www-1.ibm.com/ibm/hisotry/exhibits/pc/pc_7.html

Interestingly, all the promotional photos of these early 'personal computers' (by IBM's account) show women seated in front of the machines. Following the practice of the April 1965 *Time* cover, the machine remains an awe-inspiring presence, if only for its sheer size and not (in this case) anthropomorphization. The threat implied by this machine continues to be contained by a clear hierarchization of roles that sees (male) executives superior to the computer, which is tended and operated by women. Indeed, much of IBM's promotional material shows dominant male figures interacting with quizzical or quiescent female employees who are clearly the primary interlocutors of the machine, which loses power by association. Recall that the original sense of the word 'computer' named a human agent performing repetive tasks of calculation or tabulation—it was the term used to describe the masses of female clerical workers who computed ballistics tables and cryptographic codes during World Warr II just as the electronic computer was developed. A secretarial purpose can be inferred from several elements common to the staged photographs of the IBM archive: the women appear to be in communal typing pool areas; when men appear in the photographs, they are usually standing, usually pointing out something to a seated (literally subordinate) woman at the keyboard; these machines are marketed largely as word processors or text editors, faciliating tasks generally performed by women and lower-order clerks. This configuration of small-scale computing as secretarial in nature feminized the work performed on the machines. This was a different kind of domestication, in which computing is devalued as menial or feminized labour. At the end of the 1970s, IBM was producing two kinds of computers: 'real' computers programmed by experts (generally men) and data entry and secretarial machines operated by women. Early attempts at creating individual-use machines concentrated on upgrading the latter group, to the detriment of the machine's reputation as powerful tool. There is no real revolution in computing here, merely an expanded technologization of the traditional twentieth-century office space. The division of labour remains the same, and the roles of workers within are merely re-tooled, not revolutionized.[21]

Substantive change in direction was afoot at the company, however: on August 12, 1981, IBM published a press release, "Personal Computer Announced by

IBM," outlining the company's development of "its smallest, lowest-priced computer system—the IBM Personal Computer" (IBM 1). In addition to stressing both the diminished size and price in the opening sentence, the rest of the press release is no less startling in the deviation from standard IBM practices that it details. The very next sentence describes the Personal Computer as "easy-to-use" and names "business, school, and home" as the intended domain of the machine. The release claims that "IBM has designed its Personal Computer for the first-time or advanced user, whether a business person in need of accounting help or a student preparing a term paper" (IBM, "Personal Computer" 1) IBM had never before pitched a computing product to the home market—which is to say, across the business/home, youth/adult, man/woman divide. Throughout, the press release stresses the Personal Computer's ease of use, its capacity for personalization, the explicitness and comprehensiveness of the included user manuals, and the wide array of the machine's applications, from "stock analysis" to "video games" (2). The machine is at once useful and user-friendly, a balance heretofore unattained in IBM's product offerings. The press release de-hierarchizes computing subjects ("business person" and "student"), computing practices ("stock analysis" and "videogames"), and computing locations ("business, school, and home"). This represents a real democratization of IBM's view of computing. Its earlier efforts at cheaper, smaller-scale computing had worked to 'dumb down' its scientific computers, and to 'beef up' its secretarial machines: both practices merely modified machines that remained firmly embedded in hierarchically organized, traditional contexts of the white collar workplace.

The surprises continue: developing and marketing a fundamentally different kind of machine, IBM undertook a very different kind of business practice from the norm for the major computer maker. The notorious in-house philosophy of IBM gave way to a much more open development, sales, and support system; these processes are also outlined in the press release, an explicit index of change. The IBM Personal Computer would be sold not merely through standard IBM Product Centres and a "special sales unit" within the Data Processing Division. It would be sold through mass-market retailers, specifically through licenced Sears and ComputerLand outlets. Again, this is unprecedented in IBM practice. Retail sale of the Personal Computer go a long way toward configuring it as a consumer product. Also unusual is the development trajectory of the Personal Computer. IBM products generally took nearly five years from idea to product: the Personal Computer was conceived and released in 18 months. Responsibility for much of the machine's development was contracted to third party manufacturers, or carried out in secrecy by a special intra-company unit in Florida, far away from IBM's main corporate culture. The programs available to Personal Computer purchasers, too, were developed by third party software companies (most famously, this is the beginning of Microsoft's operating system hegemony), with separately packaged productivity and entertainment software available at point of purchase.[22] In essence, IBM was promoting products beyond its own line, usually hermetically sealed off. After the Personal Computer was released for sale in October of 1981, further, it became apparent that IBM expected third party hardware developers to supply the full range of peripheral devices to the Personal Computer (Williams, "Closer Look" 62).

Throughout the development and later the marketing of the IBM Personal Computer, IBM's corporate culture worked to emulate the successful machines of companies like Apple, sensing the market potential for a more blue-chip offering in the small-scale, (relatively) inexpensive, individual use computing market. This is often posited by the pro-hacker historians and journalists as the prime reason for IBM's success: stealing hacker methods, Big Blue used its superior corporate heft to take over a home computing revolution that others might have had a bigger share in otherwise. We can see this sort of mindset at work in the title of Frieberger and Swaine's chapter on the Personal Computer, "IBM Discovers the Woz Principle" (345), where the authors describe IBM's entry into the market as "the end of the beginning" of the entrepreneurial computer boom, and the beginning of the end for smaller hardware manufacturers, who "began to wonder if they would still be in business two years hence" (350). Responding to this anxiety, Apple took out a full page advertisement in the Wall Street Journal to 'welcome' IBM to the personal computer market, in a characteristic act of public bravado.

Arguably, though, other manufacturers ought more genuinely to have welcomed Big Blue to the field. The arrival of the Personal Computer was arguably a necessary factor in the spread of personal computing, not because it usurped the good ideas of its predecessors, but rather because it standardized and legitimized these ideas. The Personal Computer's legitimizing function is obvious. And as the world's largest, most-successful, most-recognized brand of computing products in the world, wherever IBM leads, everyone else must follow. An IBM Personal Computer was entirely free of the taint of hobbyism, and its entry to the market brought a new level of seriousness to the machine. The standardization of the market that came about after the Personal Computer, though, was just as important as any brand heft that IBM could bring to bear on the field. Ultimately, with the launch of the Personal Computer, IBM reduced the variety of the market. One of the most important legacies of the IBM's open development protocol and its reliance on third-party software and hardware manufacturers was the standardization of the industry around the specifications of the Personal Computer. Sensing that to ride IBM's coat-tails was a more than viable corporate survival strategy, the garage-based and upstart microcomputer manufacturers and software developers, the 'third-parties' to the Personal Computer, soon developed a wealth of software to make the machine nearly universally useful (Freiberger and Swaine 348), for gaming, productivity, and programming. Third party developers, with access to the hardware specifications of the IBM machine, were soon able to flood the market with cheaper but essentially equivalent 'clone' machines. IBM's entry into the market, and the suite of clones that followed hard upon the Personal Computer's introduction, had the popularizing effect of limiting consumer choice to a range of nearly identical machines, whereas prior to the Personal Computer, a wealth of small-scale companies offered competing machines that were simply too different to be legible to non-experts.

Prior to IBM's introduction of the Personal Computer, the actual variety of the microcomputing marketplace led to consumer confusion and frustration: successful purchasing was predicated on the acquisition of extensive knowledge, a catch-22. Consumer markets thrive on petty distinctions between fungible goods, not actual ones: according to James Twitchell, indeed, the purpose of advertising is to produce differences where none exist, thus creating the satisfying illusion of choice in a completely standardized marketplace (10). The consumer landscape is awash in important decisions that are nearly consequence-free: Ford or Chevy? Dell or Compaq? The importance that seems to accrue to choice between brands obscures the more fundamental, important questions: would public transit be a more responsible choice than car ownership? Why am I spending my own money on a tool I use mostly for work? Before the IBM Personal Computer and its clones, the differences offered to potential computer purchasers were simply too numerous and undecideable.[23] The choices were both too consequential (software developed for one machine generally wouldn't run on another) and too unimportant (keeping up with the Joneses was hardly an issue at this point, and neither was compatibility between machines for the purposes of sharing files, etc.). A potential owner thus required daunting levels of expertise at the point of purchase.[24] We can liken the effect of IBM-wrought standardization to the old saw about selling razors: while it is true that you give away the razors so that you're better able to sell the blades—that is, give away the IBM specifications in order to make it a standard that everyone will then be stuck adhering to—it is also possible in this case that razors are given away to promote the idea of shaving. Saturating the market with a flood of very similar consumer computing product, IBM and the clones made purchasing such a machine less daunting—more in line with other consumer purchases—and owning it more normal. Standardization also takes some of the terror out of purchasing: if 90% of the machines are basically the same, and 90% of the peripherals and software work reliably and predictably on these machines, the bar of expertise required to successfully set up an entry-level home computing system is significantly lowered. IBM's first quarter sales of the Personal Computer surpassed 13,000 machines. By the end of 1983, the company had sold more than half a million of them (Frieberger and Swaine 349). Not counting the clones. If that doesn't set a standard, I don't know what does.

As with the Apple II, IBM's Personal Computer was not just a technology of smoke and mirrors, advertising and market share: it was, importantly, a well-built machine. The Personal Computer succeeds as an engineered machine because it integrates the best features and technologies of earlier computers, and because it uses IBM's established brand presence and corporate heft to assure quality control: such a machine is itself the integrationist text *par excellence*, a point not lost on reviewers. The IBM Personal Computer offered, according to a reviewer at *BYTE*, "a synthesis of the best the microcomputer industry has offered to date" (Williams, "Closer Look" 36). Gregg Williams's extensive review, appearing in January 1982, three months after the computer's release, describes the technical accomplishments of the Personal Computer. The machine is deemed a great success, "as well designed on the inside as it is on the outside," setting a new standard for the established microcomputer industry to match. The review concludes by asserting that the Personal Computer "is as close as I've ever seen to being all things to everybody" (68). This universal usefulness is key to its success. Surveying the contemporary state of the art, the reviewer, a senior editor at *BYTE*, notes:

> What microcomputer has color graphics like the Apple II, an 80-column display like the TRS-80 Model II, a redefinable character set like the Atari 800, a 16-bit microprocessor like the Texas Instruments TI 99/4, an expanded memory space like the Apple III, a full-function uppercase and lowercase keyboard like the TRS-80 Model III, and BASIC color graphics like the TRS-80 Color Computer? Answer: the IBM Personal Computer. (36)

IBM builds on the innovations of others in the development of the Personal Computer. It is not a revolutionary machine in the sense of advancing computer engineering or even programming. What makes the Personal Computer such an important machine, though, is its adoption and integration of the best extant hardware and software designs into a consistent, workable, standard configuration. *BYTE* again:

> The genius of the people who designed the IBM microcomputer is that they managed to do everything conventionally but well—the IBM Personal Computer doesn't have any startling innovations, but it also lacks the moderate-to-fatal design problems that have plagued other microcomputers. (68).

These 'moderate-to-fatal' problems referenced by Williams speak to the fly-by-night or hobbyist orientation of much of the microcomputer industry. Or alternatively, in the case of Apple's poor successor to the Apple II, the Apple III, a matter of a company growing too much, too fast. IBM, by contast, was certainly neither fly-by-night nor experiencing out-of-control growth. The maturity of the IBM Personal Computer as a machine evidences the maturity of its parent corporate culture.

While it may not seem the most obvious manifestation of the personal computer's establishment in culture, we can chart its progress by examining keyboard layouts. In an integrationist attempt to make the home computer more like other familiar objects, as unthreatening as an ordinary office product, product development in the late 1970s and early 1980s sees the computer keyboard come ever more closely to resemble the typewriter keyboard. *BYTE* finds this peripheral important enough to devote a full graphic to demonstrating the keyboard's layout. The reviewer goes so far as to claim that "the IBM Personal Computer is a delight to use largely because of its keyboard" (43). Cooper *et al.*, in their "Human-Factors Case Study Based on the IBM Personal Computer" (1982) compare various keyboard configurations, and certainly, they do not resemble what we have become used to: the QWERTY layout, with tab keys, shift keys, and enter/return keys such as match standard typewriters. The authors of the study note that while QWERTY alphabetic key order is maintained, there is "variation in the place of the Shift, Return, and other special symbols" like hyphens, commas, apostrophes, quotation marks, and the like. They find that deviation from standard typewriter placement by as little as half an inch of these keys can negatively affect user experience (Cooper *et al.* 60). Of course, there is nothing inherently great about the QWERTY typewriter keyboard—its great advantage is that it is a familiar, standard, or, as Steven Levy despairs, "a technology entrenched more doggedly than the Maginot Line" (Insanely Great, 46). For Levy, better systems of key-style input fall by the wayside because of a cultural pigheadedness: despite its many infelicities, "we stick with the interface [because] there's too much invested in the standard to abandon it" (47).

Of the keyboards illustrated in the study's published report, the first-generation Commodore PET is most egregious in its remapping of the keyboard to a more 'computerish' standard: the main keypad is perfectly squared-off, disrupting the established geography of touch-typing, a design strategy leading to the unintuitive re-placement and re-sizing of the space bar (dramatically shrunk) and the anachronistic 'return' key (vastly elongated). The whole keypad is offset to the right of the console—that is to say, it is 'lopsided' with respect to the monitor—forcing the operator to misalign neck and arms. The alphabetic keys themselves, further, are all undersized, leading to a cramped typing style. None of the punctuation characters are placed where one would normally expect, ensuring that even practiced touch-typists must look down at the keyboard with enough frequency to vitiate the gains of maintaining the QWERTY layout. With its harsh geometries, it seems clear that the PET keyboard is designed to adhere to legacy-era assocations of computing. Such an emphasis on 'computerishness' forces upon the user's awareness precisely what ought be most invisibe if the careful gendering of the Apple ads is to be maintained: in this layout, the boundary of body and machine is made manifest, to the detriment of the human user, who finds the encounter physically frustrating and intellectually distracting. Remember that the Apple II ads minimized the intimidating iconic power of the machine by embedding it in deliberately non-threatening, feminized space; they emphasized the power and agency of the human user by showing graphs and charts on the screen, appearing by virtue of the user's will. The industrial design of the PET and other keyboards works to opposite effect, building the machine as an object to be reckoned with on its own terms, to whose strange and uncomfortable geographies the user much submit and adapt. Indeed, Campbell-Kelly and Aspray describe the PET as "not so much a computer as a calculator writ large" (247). Such a design is much more in keeping with legacy-era representations promoting the 'shock and awe' model of computing, and not with new modes of 'personal computing.'

The IBM Personal Computer, in adopting a keyboard interface more in line with the familiar typewriter (or the less threatening, feminized "dumb terminal"), integrated itself into the known while dissociating itself from the bells and whistles, switches and buttons, of what were popularly understood to be proper computer controls. At the same time, it also distanced itself from those hippie ergonomicists and utopians (like Ted Nelson or Douglas Englebart) who reconfigured computer input devices to surpass both the computer-ish and the typewriter-ish in favor of the seemingly fantastical.[25] Neither office products nor keyboards are ideologically inert—each encodes its associations to objects, (appropriate) practices, and (legitimate) subjectivities. IBM follows a solidly integrationist path, taking the middle road between establisment computing and hippie homebrew, developing a computer input device as well-constructed and familiar as the best typewriter keyboards, with additional features. For these reasons the IBM Personal Computer is lauded for its keyboard design: while the Personal Computer keyboard adds a series of function keys (in four rows of two keys per row) to the left of the main alphanumeric set, all the alphabetical, punctuation, and formatting keys are nearly perfectly mapped to the typewriter keyboard, save for the addition of computing keys like 'Ctrl' and 'Alt.'[26] Williams is clear in his praise of this ostensibly 'peripheral' device, noting several IBM innovations which make the Personal Computer's keyboard a joy to use: attachment by flexible cord, which allowed for keyboard mobility; fingertip-sculpted keys, 'plastic feet' to tilt up the keyboard for comfort; the tactile feedback of the keys when depressed; the repeat function of keys held down, the type-ahead buffer so keystrokes wouldn't be wasted; and the placement and number of the function keys to perform specific computing operations (43). This was a computer for people who wanted to *type text*. A less threatening computing activity can hardly be imagined. By showing concern for the user's experience of interacting with the computer through the keyboard, IBM designs the device so as to make that experience as ergonomic as possible, thus assuring that the user is not distracted by physical discomfort. One more source of computing friction removed. Remember that the Altair, breakthrough microcomputer that unleashed an industry, had no keyboard at all. One of the breakthroughs of the Apple II was that the computer and the keyboard were sold as a unit—one of the only true innovations of the IBM Personal Computer was that its keyboard was attached to the computing unit by a six foot coil cable, allowing it to be repositioned according to user whim. The Apple II *had* a keyboard; the IBM Personal Computer had the *best* keyboard.

IBM's marketing for the Personal Computer also manifested a change in practice. While continuing to stress the quality, service, and corporate respectability of the IBM brand, print and television ads promoted a new message: a personal kind computing and easy-to-use machines which were inexpensive to own and operable by teenagers and women. The Chaplinesque 'little tramp' television campaign quickly enlivened IBM's cold, bureaucratic image. But the machine, no longer so threatening, perhaps, now became a sort of *tabula rasa.* And so a series of print ads worked to inscribe particular meanings onto the now-evacuated icon of the Personal Computer. These ads once more interpellate new classes of computing subjects into identification with the machine by evoking powerful narratives of individualism, social and economic mobility, and family values. One full-page, full-colour print ad, appearing in January 1982's issue of *BYTE,* depicts a business-dressed woman across the bottom third of the page, smiling as she leans across an IBM Personal Computer configuation with monochrome monitor, processing unit, keyboard, and printer. Paragraphs of copy filling the middle of the page stress the inexpensiveness of computer ownership as well as the ease of use of the machine. The headline of the ad reads, in quotation marks, "My own IBM computer. Imagine that." The ad, indeed, invites readers to imagine any number of heretofore unlikely scenarios. According to the ad,

> Getting started is easier than you might think, because IBM has structured the learning process for you. Our literature is in *your* language, not in 'computerese.' Our software *involves* you, the system *interacts* with you … That's why you can be running programs in just one day. Maybe even writing your own programs in a matter of weeks. (italics in the original)

This ad copy clearly goes to lengths to differentiate itself from the established computer industry narratives that were so strongly part of the IBM corporate image. The scare-quoting of 'computerese,' for example, speaks in a deliberately non-technical or even technophobic idiom it assumes to have in common with the ad's audience: of course, up to the launch of the Personal Computer, 'IBM' and 'computerese' are nearly synonymous terms. As IBM's annual report for 1981—the year it introduces the Personal Computer—notes, "IBM computers and software play [a] key role in [the] successful first orbital flight of the Space Shuttle" (IBM, "Highlights" 15). It doesn't get much more 'computerese' than space flight. In this same year, IBM earned $3.61 billion on $29.07 billion gross income; the company's employees numbered 354,936 globally ("Highlights" 14). It takes a certain amount of rhetorical violence to bring this company plausibly into the realm of 'personal' anything. The deliberate insertion of personal goals and human culture into the realm of computing attempted by this ad is manifested in the stress on '*your* language' on how the computer '*involves*' and '*interacts* with' the individual human user. There is a tinge of hysteria to the repeated use of italics to emphasize key terms, as though these statements are contested or require special promotion. The ad seems to speak, also, to a subject who is her- or himself assumed to be prone to hysteria. The addressee of the ad is thus repeatedly asked to relax: "you might have thought owning a computer was too expensive. But now you can relax." The second verse runs the same as the first: "you might also have thought running a computer was too difficult. But you can relax again."

The personal aspect of computing is repeatedly emphasized as well. The woman pictured with the computer bisects a caption which reads, "The IBM Personal Computer and me." The woman's head is placed between 'computer' and 'and me.' This trope appears again in a similar ad, this one titled "Dad, can I use the IBM computer tonight?" This ad features a smiling teenage boy as the potential computer user, and a newspaper-reading father (pictured in a cartoon) as the ad's primary addressee. This ad invokes family, parenting, and child education, rather than personal empowerment. It, too, works hard to narrate the personal computer, or in this case, the Personal Computer, into the mundane interactions of family life:

> It's not an unusual phenomenon. It starts when your son asks to borrow a tie. Or when your daughter wants to use your metal racquet. Sometimes you let them. Often you don't. But when they start asking to use your IBM Personal Computer, it's better to say yes.

Of course, the 'mundane' interactions of family life are culturally loaded: the mundanity referenced by the ad assumes a set of middle class values: the organization of society into nuclear families, an assumption of material ease. The ad's opening paragraph nicely blends the old-fashioned with the new, and leads briskly into the future: from borrowing a tie, to borrowing a space-age tennis racket, to using a high-tech appliance never before a part of the family home, sons and daughters participate in the age-old game of gimme with their parents. Offering the use of the Personal Computer is just another item on a continuum of responsible parenthood. Kids will be kids, and as such, they will want to borrow the computer as well as everything else. The invocation of borrowed ties seems outdated in 1982, a self-consciously nostalgic reference to the 1950s, which has the odd effect of anachronistically integrating the Personal Computer into a *Father Knows Best*-inflected golden age of American family. Again, this is a loaded reference, working to minimize the threat of the new embodied by personal computing by linking the new machine to a prosperous period of American history already becoming steeped in nostalgia. Such narrative citation also mitigates the social alienation attending the more recent breaking-up of the hegemony of the nuclear family and a generational panic that youth were leading the home computing revolution. The ad text places Dad firmly in control of the machine, and at the head of his family, the dispenser of material goods, power, and authority.

Assuming the addressed patriarch has some experience with computers at work, the ad assures him/us that the computer is "just as useful at home" as in the office. It can compute the "family budget" or even "calories consumed." But the hook on which the Personal Computer's real claim on family expenditures rests on its usefulness at indoctrinating children into the brave new world of computerization:

> Just by playing games or drawing colourful graphics, your son or daughter will discover what makes a computer tick—and what it can do .... Your kids might even get so 'computer smart,' they'll start writing their own programs in BASIC or Pascal.

This refashioned slippery slope—of upward rather than downward mobility, from childish colouring and recreational gaming to professional level computing skills—is what makes the computer "one of the best investments you make in your family's future." Borrowing use of the family Personal Computer is much more consequential than borrowing an item of clothing, or a piece of sporting equipment: it affects Your Children's Future. Interacting with the Personal Computer, your child will: "write and edit book reports" and even learn "how to type" on the same machines used in corporate offices. These practices intepellate Dad and children into a new vision of white collar work as computer-mediated. As with the "Imagine That" ad, "Dad, can I use …" narrates a vision of upward mobility—both social and technological—attainable via access to the IBM Personal Computer. These ads makes extensive use of the second person pronoun in direct address. The "My own" ad goes so far as to italicize the second-person possessive twice, at the beginning and end of the ad text: "One nice thing about having your own IBM Personal Computer is that it's *yours*," and "*Your* IBM Personal Computer." The sales text that comprises the bulk of the ads is in both cases framed by larger-type headlines, ostensibly quoted dialogue issuing from the Personal Computer user pictured at the bottom of the page. Making use of the first person pronoun in the headline ("*My* own IBM computer …" and "Dad, can *I* use …"), and the second in the body, the ad text effectively accomplishes two things: first, it encourages readers to identify the pictured subject as a legitimate user or owner of the IBM Personal Computer; second, in switching from first-person speech to second-person address, it aimes to make readers identify with the depicted subject, and see themselves as legitimate, even expected, users and owners of this same technology.

Like the "Dad, can I …" ad the "My own IBM computer…" ad similarly references class markers. The machine is to be used for "your business, your project, your department, your class, your family and, indeed, for yourself," implying both the professional status of the addresses and the availability of leisure time. The woman pictured in this ad is of indeterminate corporate status, but her ambition is clear: she wears 'the uniform' popularized by John Molloy in *The Woman's Dress for Success Book* (1977). In this bestseller, Molloy suggests that upwardly ambitious female executives adopt a 'uniform' consisting of a skirt suit with blouse, shoulder length hair, and unobtrusive glasses (35, 55, 85, 88). The woman pictured in the ad wears a combination that tested well for Molloy, a sartorial armour which blurs her corporate status: she may already be a corporate executive, or she may simply want to become one.[27] In either case, she is 'dressed for success,' and the implication is that the IBM Personal Computer is the latest addition to the uniform. Upward mobility or established position is probably necessary to stress in the ads, as, while more inexpensive than any other computer IBM had yet produced, the Personal Computer did not come terribly cheaply. Both ads minimize sticker shock by soft-pedalling the price tag for the IBM Personal Computer: the phrase "starting at less than $1,600" appears in each. Both ads also describe this price as inexpensive, clearly an assessment directly related to assumptions about the income levels of potential customers.[28]

While one ad features a teenage boy and the other a 'career woman,' both less powerful (and less moneyed) subjects than adult men, a certain social class and spending power are implied. It is a split gendering that proposes professional men as the primary user of the machine, all the while promoting the spread of computing to other subjects: if we have to imagine the woman and the teenage boy as users of the machine, it is because the ads propose a baseline of corporate male use. This baseline is largely illusory: remember that the vast majority of IBM office computing-machines were secretarial/clerical, and not intended for use by the mostly male managerial classes who signed the monthly lease cheques. In effect, the ads create two new categories of computing subjects: the ostensible target of the ad, the teenager or the ambitious woman, as well as the professional male.

Other integrative advertising strategies

Other computer companies also employed integrationist advertising strategies, minimizing the estranging features of the computer or of computing in order to gain access to an expanded customer base: tactics include the use of celebrity endorsements to associate new products with the known, careful visual design of the ad space, and the provision of carefully promoted informational literature to allow potential consumers/users to feel some control over what newness remains. Texas Instruments hired Bill Cosby to promote its "Basic Computer" (the TI-99/2): the be-sweatered scion of family-oriented comedy is depicted smiling and pointing at a colourful machine in a 1982 ad for the TI software library, and, again, cradling a small machine in his outstretched arms in a *Popular Science* ad of 1983.[29] The use of mainstream celebrities to promote computers is novel to the 1980s: in keeping with the general starburst aesthetic of 1970s hobbyist-directed ads, such endorsements were historically provided by science fiction luminaries, the well-known as well as the more arcane. For example, Isaac Asimov graces the back cover of *BYTE* in February of 1982, promoting the Radio Shack TRS 80 Pocket Computer: he asserts that "[a] few years ago, the idea of a computer you could put in your pocket was just science fiction." That may be, but the association of consumer or personal computing with geeky genre fiction is a fading draw.[30] Another set of ads for Commodore's VIC-20 uses explicit design and language cues to promote the machine. The ad specifically designates the VIC-20 as "The Friendly Computer." The computer is pictured beneath a blue-sky and a rainbow, under fluffy white clouds. The Key Tronic computer keyboard advertisement stresses its kinship to the typewriter: the keyboard features "Familiar Key Legends Rather Than Symbols" (that is 'Tab' instead of '→|'), "SHIFT Key in Familiar Typewriter Location" and "RETURN key in Familiar Typewriter Location" (Key Tronic). We get it: there's nothing scary about this keyboard. Celebrity spokespersons, deliberately infantile visual design and copy text, and a stress on the familiar mark mainstream computer advertisements of the period. Nearly all ads adhere to the integrationist strategy.

Rainbows, Bill Cosby, and familiar keyboard layouts notwithstanding, personal computing does hold its terrors—if not of 'electronic brains' taking over the household, then of personal ignorance barring entry to the home computer revolution, a fear to which a million VCRs across the continent bear a blinking witness in perpetual midnight. To address this concern, both Commodore and Apple publish ads offering to help consumers learn how to distinguish between competing computers, and to gain enough computer literacy to feel empowered to purchase their own machine: such practices attest to the lingering anxiety circulating around the machines and practices of computing. Commodore's ad is headlined "How to Become Computer Literate," and Apple's is titled "How to buy a personal computer."[31] This ad outlines "Who uses personal computers," "What to look for" in a machine, and "How to get one." The ad text is chatty, helpful, friendly; it does not reproach the reader for his or her ignorance. Indeed, interested consumers are invited to mail away for an even more detailed brochure on the topic. These publications, while certainly pitching the company machine, still serve an educational function, allowing consumers to feel knowledgeable and therefore powerful.

Computer advertisements, as well as machine design and packaging, struggle to maintain a difficult balance: promoting the wonder and newness of the 'personal computer' they worked to sell while minimizing this machine's association to the awesome 'electronic brain' of the legacy system of representation. These texts also walk a fine line between describing the personal computer as an essential tool for successful living and recalling the technological determinism of the classic dystopias. Apple and IBM each work toward this middle road of unexceptionable representation. Apple's split advertisements, divided between a firmly feminized evocation of the home and the fetishistic depiction of the machine as an object of (masculinized) techno-lust bespeak the company's need to break away from its garage and hobbyist origins into a more firmly mass-market consumerist orientation. At the other end of the spectrum, IBM deliberately invokes (somewhat) progressive depictions of non-standard female and teenage computer users in its bid to play down its own branding as a purveyor of large scale corporate computing machines. Both companies work against their reputations to narrate an unthreatening yet powerful machine for use by individuals, consciously working against a legacy-inflected technophobic consumer skittishness, urging consumers to 'relax' and supplying them with information booklets. Ultimately, non-fictional integrationist texts take an ideologically conservative position in narrating the role of the personal computer and the subjects who will use it, carefully associating the machine with traditionally valued spaces and subjects: the white collar workplace, the home, the nuclear family. They also narrate the role of the personal computer in attaining established goals appropriate to the individualistic values and practices of Western late capital: upward social mobility, meritorious economic advancement, and the extension of human agency via friction-free technologies of personal empowerment.

An Even Braver New World

Fictional texts, selling nothing but the stories they tell, are much freer to narrate a wider range of computing machines and computing subjects, for purposes of dramatic tension if nothing else. However, the integrationist fictional text, while more ambiguous and less immediately conservative than its advertising and corporate non-fictional counterparts, nevertheless has much more in common with these than with the fantastic/utopian or critical/dystopian narratives. Fictional integrationist texts continue to promote 'better living through computers' via narrative evocations of legitimized computing machines and subjects firmly embedded within established practices of everday life: once more, this legitimating function is enacted via the deployment of traditional gender roles, hierarchized workplaces, and patriarchal family structures. Deviations from these norms ultimately serve to *reinforce* their basic validity, with personal empowerment and the doctrine of individualism trumping every other concern. The computer of the fictional integrationist text often appears in popular films that are set in the contemporary moment, are not 'about' computers in any essential way, and adhere to conventions of established Hollywood feel-good genres such as comedy, romance, the 'teen' film, or family entertainment. While some of these films may well deploy their computer-ish aspects—that is, the iconography associated with computing—in their advertising campaigns, or make a spectacle of them within the narrative, at base they are not made to differ substantially from generic templates by the adoption of computers as plot-actants. For example, *Jumpin' Jack Flash* (1986) is a comedy-thriller, with a dash of romance thrown in at the last moment, and a separately-credited computer animation sequence of the 'blinkenlights' variety that, so far as I can tell, largely served to provide interesting coming-soon footage for the trailer—which doesn't mean that their representations of computing are simple, or without consequence.

In each case, idiosyncratic protagonists further their own interests via personal computing, in much the same way as in the non-fictional advertising texts; however, the social fields in which they operate present a richer ground of possible modes of computing. Fictional integtrationist treatments of the personal computer deploy the new machine more explicitly as a symbol via which to broach contemporary concerns endemic to 1980s culture: over the course of the decade, the personal computer becomes nearly as prominent a visual icon of 'yuppie' advancement, the spread of capitalist individualism, and Reaganomics as is the Manhattan skyline. The fictionalized personal computer, additionally, offers some redress from fear of nuclear annihilation, Cold War spy games, and the threat of Japanese technological (and thus economic) supremacy, a set of concerns that paralyse critical/dystopian texts. Depicted computers of the fictional integrationist text both signal these anxieties and offer the means to resolve them. They are deployed in two main spaces: in the workplace and in the home.

Computers in the Home

More ambivalent—and more immediately topical—than the non-fiction texts addressed so far is John Badham's 1983 film *WarGames,* a text Steven Poole calls "the super slice of 1980s teen paranoia" (74). The film sits uneasily at the boundary between two quite different genres: the military action/thriller, and the teen romance/coming of age narrative. The link between these two genres is the computer: by hacking inadvertently into NORAD systems, teenaged protagonist David Lightman (Matthew Broderick) starts a 'game' called Global Thermonuclear War. Only after starting the 'game,' however, does David realize what he's gotten into—he's set the WOPR (War Operations Planning Response) computer on a countdown to a Cold War holocaust all too real. Although seemingly anchored in the teen-film genre, in which case viewers would expect to root for the Tom Sawyer-ish teen, the film's promotional poster, title, and subject matter—bunkers, war games, and 'global thermonuclear war'—set the stakes much higher, and position *WarGames* within another generic tradition, the thriller, the issue film, or the military movie.[32] The film opens on this more serious note, depicting a technologized missile silo and an underground command centre, narrating a simulated nuclear crisis that sees the launching of weapons halted by wary soliders: in a tense scene, one of the two keyholders refuses to do his part to activate the weapon, and is charged at gunpoint with insubordination by his fellow officer. Later, we see that these undependable human agents have been replaced by a humming and glowing computer the size of a chest freezer, ensconced (enshrined?) in a subterranean command centre. These early scenes explicitly recall the dystopian representations of military computing established through the 1970s. As Paul Edwards notes, "[t]he iconography is by now familiar: a dark, enclosed, artificial space; a computer-simulated, abstract world; an AI; an apocalyptic conflict" (329) that draws on the representational legacy of apocalyptic military films like *Fail-Safe* (1964) and *Dr. Strangelove: Or, How I*

Learned to Stop Worrying and Love the Bomb (1964)—and, I would add, computer dystopias like *Colossus: The Forbin Project* (1968).

Fast cut to the teen plot: we meet David as he is squeezing in some time on *Galaga* at a local videogame arcade. This makes David late for class, where we learn he is not doing very well. Sent to the principal's office for mouthing back to his science teacher, David takes the opportunity to social-engineer his way into the school network, cribbing the password from a note that sits near the computer.[33] Later that afternoon, David uses his home computer and modem to dial in and change his grades, much to the indignant protests of his much-impressed friend Jennifer (Ally Sheedy) who tells him he could go to jail for such activities. David scoffs. At dinner, leafing through a videogame magazine, David concocts a plan to crack game-producer Protovision's computer to access the latest games. The first step of this plan is to have his computer dial every number in three different exchanges in Sunnyvale, California, where the company is located. These early sequences in the film set David up as a slacker and a cracker; he plays arcade games instead of attending school, he underachieves, he sasses back, he uses his extensive home computing setup for illegal and annoying purposes.[34] Reviewing this scene, Timothy Leary writes, "Get it? He's an electron Jock. A Quantum Wizard" (537). Leary intends this assessment to be complimentary, but at this point in the film, it is not obvious whether David is a character to be feared or cheered.

Certainly, the initial negative portrayal of David Lightman amounts to a scare tactic that draws on media headlines to make director John Badham's point that placing nuclear war under the stewardship of computers is a responsibility dangerously abdicated. Missing Badham's intended focus, Timothy Leary writes: "Okay, we get it. Matthew [Broderick's character David] is ungovernable. He's a cyberkid" (537). But that's not what audiences were supposed to 'get.' Speaking at a conference of the Physicians for Social Responsibility, Badham noted that while the figure of the teenage gameplaying hacker fascinated reviewers and audiences, he was really trying to make a case for the 'flexible response' model of nuclear war—one in which human agents rather than simulation-crunching computers hold sway over the decision-making process (Badham 193). For Leary, contemporary reviewers, and later critics, however, *WarGames* comes across rather as a battle between personal kinds of computing and institutional ones. Here was a compelling subject indeed: David and his consumer technology may have been intended as the foil for the WOPR, but *WarGames*, in making the central conflict appear to be between a home computer (and its hacker) and a supercomputer (and its military/bureaucratic tenders), soon becomes a film about modes of computer use despite itself. As Samuel Butler found before him with *Erewhon*'s "The Book of the Machines," an author's intended focus can be shifted if the background materials strike a rawer cultural nerve. And so hero-hacker teen David's off-the-shelf IMSAI 8000 plays a major role alongside WOPR (Freiberger and Swaine 351).[35] A machine like the IMSAI, after all, is a computer one might reasonably expect to come across in real life, which one could, in fact, purchase. One's teens, indeed, might resemble David: playing videogames, goofing off, and fooling around with the home computer. David is the implied resident of the room referenced in Apple's ad for the IIc, the teenager with rock poster and computing equipment. He is the teengaed son of the IBM ad, an all-American boy who needs to use the computer to get good grades—not to earn them but change them. Early in the film Badham invokes the popular debates about videogaming and about teen computer use to establish David's character as a loose cannon. Ultimately, it is impossible for viewers to lay this inflammatory depiction aside as simply a plausible pretext leading into the 'real' story, a cautionary tale of nuclear war, promoting flexible response.

Fred Glass suggests that *WarGames* references a widespread public anxiety about the effects of computerization on culture. He writes that in the film "[t]he computer and related technologies seem to be transforming human relationships and personalities—those closest to the vortex run the risk of getting sucked under" (22). One such imperiled institution in *WarGames* is the nuclear family. The domestic power structure in the film is as visibly imbalanced as the international one, with David doing what he pleases under the very noses of his nervous but powerless parents. Troublingly, his parents are as clueless and inept as David is wily: they both work and are thus largely absent from the home, and rushed family dinners are marked by the inattention of family members to each other and the serving of illcooked foods. One early scene shows Mr. Lightman fighting with the dog and covered in garbage as a result of David's negligence—his mother calls out uselessly to him as she runs off to her real estate job. As Mr. Lightman cleans up this mess of David's making, the teen hacks military computers from his bedroom. The Lightman family home in *WarGames* offers us the counterpoint to the 50s-styled patriarchal utopia of the IBM "Dad can I use the IBM computer tonight?" ad. In the anxious space of the nuclear family in *WarGames*, it is David who is the technological master, operating expensive and powerful machinery his parents do not understand and cannot control. They certainly seem unable to control David, and we have already seen him to be similarly heedless of the strictures of the education system. Judith Kerman suggests that these early scenes show David to be disconnected from his parents' social mores, not realizing that the world outside the computer is more important than the world in it—that is, David feels no qualms about automatically crank-calling 30,000 people in his fairly random search for one phone number (197).

Ultimately, though, David is not legible as an agent to be feared. The narrative recuperates him into the position of hero, the only one able to stop the deadly game we soon forget he has himself started. The military machine proves itself as inept and outmoded as David's parents: unable to distinguish between WOPR's simulations and a real nuclear emergency, unwilling to believe the testimony of a teenager, and incapable of stopping the processes they are meant to control, the established powers of society show themselves dangerously impotent in the new computer order.[36] As the countdown toward 'Global Thermonuclear War' ticks inexorably down, the movie narrates David's battle to hack his way back out the problem—a problem that The Powers That Be, all educated adults, seem incapable of resolving or even understanding.[37] David may have started the 'war,' but he is the first to figure out what has happened, and the only one who can make the game stop. David enacts a new relationship to the computer, one in which enlightened human intervention can control the super-machine (Edwards 330).[38] Accordingly, most commentators read the film as a paean to the hacker ethic over outmoded bureaucracy—which is to say, David represents another instance in a long line of American free thinkers who defend individual freedom, in this case the freedom to place a person rather than a computer at the helm of the American war machine. Once more, Timothy Leary: "The film celebrates the independence and the skill of cyberpunks who think for themselves and innovate from within the static system" (537). Leary, interested in new subjectivities for the digital age, nominates David Lightman as the emblematic reality pilot for this ostensibly new era. Leary writes that

> Every stage of history has produced a name and an heroic legend for the strong, stubborn, creative individual who explores some future frontier, collects and brings back new information, and offers to guide the gene pool to the next stage. Typically, the time maverick combines bravery with high curiosity, with super-self-esteem. (529)

Leary proposes the 'cyberpunk' as model subject for the computer age, enacting "the personalization (and thus the popularization) of knowledge/information technology. Innovative thinking on the part of the individual" (534). Prometheus and Christopher Columbus are named as other notable cyberpunks. If such well-established and revered icons are nominated as David's antecedents, though, how revolutionary can we understand him to be? At base, David's iconoclasm and individualism comprise the most conformist position of all. His rebellion is recuperated into social responsibility, and his talents deployed for the greater good of the entire world, in what Leary suggests is a grand tradition. By the film's end, David is the good American rather than the bad son or the poor student—or the maverick computing subject. As proposed in the IBM "Dad, can I use the IBM computer?" ad, videogaming and other activities at the domestic personal computer serve to induct David into valorized social practices, practices now newly undergirded with computers.

Edwards writes that " in the 1980s … computers were transformed from alienating instruments of corporate and government power to familiar tools of entertainment and communication" (330). *WarGames* bears this out. Neither of the computing technologies portrayed in the film can ultimately be understood to be 'evil' in the sense of asserting malevolent agency, although the WOPR certainly has the power to wreak havoc. *WarGames* thus becomes a film about the computers of the past confronting the computers of the present, rather than solely about models of nuclear deterrence.[39] And the computers of the present are far less grand than what audiences had become used to, a deflation in scale and purpose that returns us to the more prosaic world of the teen-film genre—in many ways, David's personal computer is simply an object, a toy, a status symbol, and a marker of his growing independence. The computer has a role to play in David's social life. While it takes up a fair amount of David's bedroom, the IMSAI is not awe-inspiring as were former computers, especially when it is repeatedly depicted with Jennifer smilingly draped over it as David types. Teenage girls are awe-inspiring in an entirely different way, and David finds the only way he can try to impress her is by showing his prowess with the computer.[40] Other integrationist films narrate the computer-enhanced adventures of teenaged boys trying to impress girls. Lacking the *gravitas* of a nuclear-annihilaiton subplot, these films manage to enmesh computing even more tightly into the fabric of middle-class teenagerhood, proposing the personal computer as a particularly interesting and powerful toy that allows its users to come into their own, in the perpetual teenage quest to evade parental control. It is a particularly male coming of age narrative, this turn to the mastery of formal systems as index of social status. Sherry Turkle notes the predilection of adolescent boys to hacker activities in an article which addresses the gendering of the computer. She writes that because the computer is a formal system, and formal systems are, by definition, completely knowable and rule-based, "[t]he computer is a medium that supports a powerful sense of mastery" (Turkle, "Reticence" 42). Turkle identifies the period of adolescence as one in which human subjects feel most powerless, and thus most prey to the charms of turning inward to formal systems. She writes that teenagers "come to define themselves in terms of competence, skill, in terms of the things they can control" (44). "Hacker culture" comes to be coded male at this time, she continues, "because, in our society, men are more likely than women to master anxieties about people by turning to the world of things and formal systems" (44).

The filmic record certainly bears this out, documenting a veritable revenge of the (male) computer nerds in the 1980s, and not just in *Revenge of the Nerds* (1984), the pocket-protectored heroes of which evince a love of the mastery offered by computing machinery. Likewise, the protagonists of 1985's *Weird Science*, Wyatt and Garry, are small, gawky, and unpopular—but they have computer skills. Watching a rerun of *Frankenstein* on Wyatt's TV, Garry hits upon the idea of creating their own dream girl, using the computer. Like Ferris Bueller's and David Lightman's, Wyatt's bedroom is equipped with a personal computer, again an off-the-shelf consumer machine.[41] Wyatt and Garry decide that their personal computing power is insufficient to the task they've laid out for themselves, and decide to hack a military installation to gain more computing power. A becoming-standard montage of computerized graphics, password hacking, and tunnels of light accelerating across the screen follows. We next see some sort of military officer in a room full of big computers suddenly haul his feet off the desk to stare peplexedly at a video display terminal. A wide shot of the night-time city skyline shows suddenly dipping light levels. This sequence has a *pro forma* feel of generic necessity, a reference to the power of earlier depictions of similar scenes, the 'familiar iconography' Edwards reads in *WarGames*, only without teeth: this hack endangers no one and is perpetrated in the service of a girlfriend-acquisition scheme pursued by two hopeless losers. *Weird Science* updates the Frankensteinian dream of creation and alchemy by conflating this with the bloodless and nerdy power of personal computing, a less distasteful and nominally more plausible strategy. The personal computer, an index of nerdiness in Wyatt's bedroom, offers the boys an escape from nerdiness into social power.

Ferris Bueller's Day Off, another John Hughes film, is a more straightforward technologically-mediated teen picaresque. Canny—if idiosyncratic—deployment of personal computers, music synthesizers, several answering machines, and, of course, fast cars update a day-off plot at least as old as *Tom Sawyer*. The film narrates a continuum of teen high jinks that draws an equivalence between lamplight-heated 'feverish' thermometer readings and networked-computer hacking. It is the seamlessness of this continuum, the blending of traditional high-jinks and high-tech fakery, the ingenuousness and charm of its protagonist, and the clear genre identification that serve to integrate new computing technologies into the everyday lives of typical high school students.[42] Throughout the film, Ferris proves himself capable in the best tradition of tomfoolery: he makes use of disguises, mad dashes, and personal charm to outwit the forces of conformity and school attendance. However, his arsenal of evasions and excuses is supported by an array of newly-developed consumer technologies ranging from stereos, intercoms, and multiple phone lines to answering machines, music synthesizers, and personal computers. Each of the film's ruses is predicated on the teens manifesting a greater technological prowess than the adults: expecting phone fraud, various authority figures are nevertheless unprepared for multiple-line phone fraud. Ferris proves himself adept with the computer as well—like David Lightman before him, he manages to alter his 'permanent record' from the comfort of his own bedroom. Vice principal and nemesis Mr. Rooney helplessly watches his computer screen as Ferris's attendance records improve before his very eyes. The personal computer here adds a veneer of topicality, of the precociousness of modern youth; remember, this was a time when adults first began to manifest anxiety over their incapacity to set the clocks on their new VCRs, let alone program them. Ferris Bueller's day off may be the result of home-brewed computerized special effects that allow him to sound tubercular over the phone, and look like an 'A' student over the network, but it is still a teen big-day-in-the-city film.[43]

Computers at Work

As much as personal computer use develops predictable age and gender markers in the home, in fictional as well as non-fictional depictions, the workplace vision of personal computing also adheres to (emerging) generic conventions. The shift in practice identified in IBM's advertising—which sees the feminized, clerical, wordprocessing machine transmuted into a universal productivity tool—can be traced in fiction as well. However, like IBM's texts, films like *Jumpin' Jack Flash* and *Working Girl* (1988) very much depend on careful gendering of machines and interpersonal relations to narrate a socially acceptable version of personal computing that once more blends a vision of the new machine's power to extend personal agency, while it downplays its threat via techniques of feminization, or through the recuperation of computer-enabled subjectivities into acceptable social norms (generally, heterosexual romantic relationships). This is the case with *Jumpin' Jack*

Flash and *Working Girl*, two films that see its heroines triumph over a masculinist corporate environment through idiosyncratic and canny exploitation of personal computing technologies—but which end by re-integrating these upwardly mobile women into the social order by offering a heterosexual love match as the pinnacle of their ambition. Unlike the computer ads, though, these films feature computing subjects beyond the pale of middle-class, white American femininity: *Jumpin' Jack Flash*'s Terry Dolittle is an African American woman whose sensibilities are downtown urbanite rather than Wall Street banker, and *Working Girl*'s Tess McGill is firmly bridge-and-tunnel, with grating accent and *bouffant* hair to match. Each is othered with respect to the New York corporate norm we can see in other films like *Wall Street* (1987), or even *The Secret of My Suce$s* (1987), but new technologies allow them to each achieve greater success in this competitive space than might otherwise be possible: Terry triumphs over workplace restrictions on computer use to solve an international spy mystery, and, somewhat more prosaically if no less fantastically, Tess boosts herself from the secretary's chair to the boss's office.

Martin Kevorkian discerns an emergent trope in 1980s action film that consistently sees African-American men cast as computer operators. He suggests that this Hollywood tendency to place black bodies in front of the computers results from a panic about the new machine; that, most generally, "[d]ystopian anxieties about the invasion of the personal computers … begin to correspond to a new white construction of blacks as computerized persons" (307n13). Whatever their utility on the ideological register, such depictions also accurately reflect racial, if not gender, realities of workplace computer use in the decade. Anne Machung, in her study of the changing nature of secretarial employment over the early part of the 1980s, notes that at mid-decade, 80% of the 17.3 million clerical workers in the United States were women (63). This feminization of clerical work occurred in the early decades of the twentieth century, long before the advent of the computer, but Machung sees a new split emerging in the office, a split between traditional secretarial jobs (which she defines as involving "work in front offices in one-on-one relationships with … bosses") and data entry work ("in back offices, in large, factory-like centers, endlessly typing all day") (65).[44] Data entry clerks are twice as likely to hail from a visible-minority population than are secretaries (Machung 65). Data entry is more likely to be centrally supervised, and its workers to be subject to productivity quotas (Machung 76). Feminized clerical work of all kinds is generally among the first areas of an organization to be automated (Machung 62): women's work is thus somewhat ambivalently or fearfully at the vanguard of the workplace personal computer revolution—despite the glowing smile of the upwardly mobile female office worker of IBM's construction. Women's relationships to workplace computing in the films of the 1980s reflect both the dream of gender-blind upward mobility proposed in advertisements as well as the workplace reality of increased surveillance and drudgery. Additionally, as Kevorkian asserts of the black male computing subject of action films, computing women offer strategies "of containment and instrumentalization, disembodiment and sacrifice" to a culture as yet unsure of what to make of the new machine (Kevorkian 286). That is to say, women's relationship to computers in the integrationist fictional text is symbolic, as well as realistic.

Jumpin' Jack Flash overtly deploys a computer gimmick to liven up a formulaic spy tale, which it blends with workplace comedy. Protagonist Terry Dolittle (Whoopi Goldberg) works for a bank's corporate office, in a glass office tower in Manhattan's financial district. What warrants this film's inclusion here is that Terry makes highly personal and idiosyncratic use of computing technology, demonstrating a very individualistic orientation that empowers her without threatening viewers. She seems an unlikely cyberspace cowboy, but such the movie will depict her to be, integrating computer use into the fabric of a character more seemingly intent on operating within the genres of slapstick, action, stand-up comedy, and blaxploitation than as a promoter of the home computer revolution. *Jumpin' Jack Flash* is an integrationist text because of the skill with which it exploits new technologies, both in its narrative and in its production techniques, while firmly embedding these new technologies into a standard genre and the fabric of an unlikely, and ultimately non-threatening, 'expert' character. The film establishes Terry as the office computer guru early in the film: productive but eccentric, Terry fixes monitors for grateful colleagues, and engages in friendly, unauthorized text-based banter with her virtual interlocutors on the international money-transfer network: a model global citizen, Terry shares a recipe for 'Yankee Pot Roast' with a colleague in Japan, gives dating advice to a French counterpart, and jokes around with German banker Fritz. Terry brings a personal flair and an engaging if unorthodox technophilia to her work. This behaviour is frowned upon in her conservative workplace, where surveillance is rampant and the management style might be described as 'browbeating.' The office manager, Mr. Page, patrols the perimeter of the cubicled workspace, positioned above and behind the workers for maximum panoptical effect; further, the employees are repeatedly warned that all their computer transmissions are logged. These surveillance devices work to assure conformity to standards, to discipline in the Foucauldian sense, among the workers. The workplace thus evoked speaks to contemporary anxieties regarding the computerized workplace, in which workers are themselves turned into machines.[45] To this point, the film fairly accurately reflects Machung's survey of contemporary American data entry centres and so Terry's workplace is recognizably like many others: an assorted cast of interesting and dull coworkers, a boss determined to wring every last minute of productive time from harassed employees, and a 'cube-farm' office arrangement in a perfect grid of matching grey furniture. This space has filmic as well as sociological antecedents: the office *mise-en-scène*, recalling Jack Lemmon's office *cum* veal-fattening-pen in *The Apartment* (1960), is updated for the eighties by the replacement of the ubiquitous typewriter with the ubiquitous computer terminal, a Sperry Rand box of some description.[46]

Mr. Page, the office manager, operates as a foil for Terry's non-conformity, enacting a more traditional view of appropriate computing, as in the following exchange in which Terry is reprimanded for her non-standard network transmissions. Called on the carpet and asked to account for deviation from the standard script—that is, communication exceeding the simple exchange of technical information—Terry is unrepentant. Rather than end each financial transaction with the coded 'end trans' command, she indulges in a little textual friendliness. Her supervisor protests:

> MR. PAGE: "Computers are not friendly."
> TERRI: "I'm not a computer!"
> MR. PAGE: "From 9 to 6 you are!"

Again, this exchange reflects an undercurrent of actual employment reality. As Machung expresses it, "the new personality skill demanded of the VDT operator is not the willingness to adapt oneself to the personality and needs of another person, but the willingness to sit and type all day long" (73). At the institutional level, computerization of the workplace represents "the extension of vast amounts of electronic control into the clerical sector, with greater constraints placed on social interaction" (Machung 77). Terry is threatened with dismissal if she does not conform herself to the methods of the machine, but the narrative ultimately rewards her with adventure, love, and the moral high ground for her refusal of this conformity. Sheer comparison to the boss whose edicts she defies marks her immediately as an iconoclast and a people-person, a much more sympathetic narrative position to occupy than that of the poorly-toupée'd, rule-bound bureaucrat Mr. Page. In the bland sea of terminals, Terry's workstation is festooned with pop-art prints, kitschy knick-knack, magnets, and bumper stickers. She is community-minded as well. As she fixes colleagues' malfunctioning terminals, Terry becomes a sort of small-time folk hero, circumventing inefficient 'proper channels' and manifesting a healthy disregard for the ostensible aura of the machine. A particularly timid co-worker, Marty, is made nervous by Terry's aggressive repair methods, fluttering a warning, "That's a very delicate piece of technology that should only …"—we can only assume he means to conclude 'be handled by experts,' because his pleas are drowned out by Terry's successful, if violent, hard-thump method of machine repair. The computer is Terry's tool of personal expression and liberation from the strictures of corporate conformity, and it too benefits from this representation, becoming a tool of personal agency rather than surveillance and control, although, of course, it is both.

Not only does Terry fail to manifest the expected reverence and awe that computing work would seem to require, she also engages in behaviours downright hacker-esque in tone, although the word 'hacker' is never invoked in the film. The main storyline of the film is based on espionage: through her recreational use of the networked terminal, Terry is contacted by a 'mystery man' who sets her a series of tasks to solve. The first task is to guess his computer password, his 'code key,' ostensibly so that they can secure a private computer channel over which to speak.

The login name 'Jumping Jack Flash' is all the information Terry has at her disposal. She methodically searches through Rolling Stones lyrics to gain the password, going so far as to find the sheet music for the song from which 'Jack' draws his name: here she finds the password, the song's key signature 'B-flat.' Like *WarGames*'s David Lightman, Terry displays energy, creativity, and intelligence in this hack. Rather than start a game of nuclear brinksmanship, though, Terry is rewarded for her diligence by a wild display of computer graphics, a veritable virtual fireworks display, a testament to her skill. Jack, it turns out, is a stranded spy in danger from his own superiors, British intelligence officers. Terry undertakes a mission to hack the British consulate's spy computer, another computer we recognize from the legacy system: the cold war room-sized monster. Terry shows her mettle here as well, extracting from the machine the information that Jack needs to free himself. Personal computers and personal computing are here clearly distinguished from spy computers, the monstrous HAL-like machines tended by guards and locked in their own wings of secured diplomatic buildings.

Jumpin' Jack Flash integrates Terry's computer use into the standard spy comedy, segueing from Terry's initial sit-down, purely virtual spy-activities on the terminal to more conventional midnight *rendezvous* at the wharf and to extended chase scenes. Terry's computer is carefully distinguished from the spy computer, visually different and put to different use: but maybe not so different after all, as Terry's computer use is repeatedly proposed as her ticket of entry into the espionage game. As several of the film's more professional spies express wonder at the involvement of a rank amateur in their affairs, Terry can only splutter "I work for a *bank*; I use a *computer*!" as if to explain away the incongruity. This phrase becomes her mantra. The film thus integrates hacker activities into the established character portrayal of lovable oddball, the iconoclast individualist, the fish out of water. It also marks computer use as a potential on-ramp to adventure. Terry may display a real talent for unauthorized computer use, but at the end of the day, such activities result in a restoring of justice and the acquisition of a love interest: is it any surprise that 'Jack' and Terry eventually meet and fall in love?[47] The computer becomes literally an instrument of courtship near the end of film, as we see Terry settling in comfortably at the keyboard to commune with 'Jack,' whose voice magically transmits in emotion-rich voice-over as the two type messages to one another. As Terry types, we see that 'Jack' is actually in the room with her, an eerie telepresence that resolves into physical contact as he reaches out to touch her shoulder.

But what of the workplace, whose initial conflicts establish Terry's character? Under the influence of a spy 'truth serum,' Terry rampages through her own office, and symbolically dethrones Mr. Page by publicly ripping the hairpiece from his head. She ultimately receives a promotion, a highly unlikely scenario considering she has repeately broken company policy, arrived at work under the influence of illicit drugs, and assaulted her boss. But such is the narrative logic of Hollywood comedy, if not the American workplace. The sheer goofiness of the film also allows it to raise, and skirt, other issues as well, notably Terry's highly-marked race and gender positioning, spectacularized largely through the larger-than-life characterization of Terry by Whoopi Goldberg. The film, indeed, earned itself an 'R' rating, indicating that some of its aspects are beyond the pale of polite society.[48] The 'R' was almost certainly earned by the rampant swearing: Terry has a mouth like a longshoreman, swearing to such a degree that one character claims she has Tourette's syndrome. Throughout, as she battles racist police officers, poorly equipped rental housing, straight-laced tight-assed corporate bosses, and snooty English upper-crust spies and diplomats, Terry offers a spectacle of femininity, of embodied irate blackness, of social inappropriateness: she swears immoderately and with great vigor; she appears in a 'drag' version of herself; she names and derides racist behaviour at the top of her lungs. It is hard to imagine a less virtual subject; and yet, it is Terry who offers the model of 'personal' computing for the film.

Ted Nelson, trying to understand why computers have such a poor reputation in the late 1970s, suggests that "the Machine is often contrasted with an idea of a Warm Human Being," such as in Chaplin's *Modern Times* (*CL* 9). Nelson, however, sees a third agent at work—he argues that the Warm Human Being exists in the space in-between the too-rational machine and the too-irrational "being who goes too far" in the other direction, a character often called by the names "Bum," "Nigger," or "Hippies" (*CL* 9). The strange bedfellows of deeply-othered protagonist and shiny clean technology oddly mitigate each others' estranging effects: more-human-than-human Terry and more-virtual-than-virtual communications technology. Such a depiction is in keeping with the conclusions reached in Kevorkian's work on action films of the later 1980s and 1990s: "[i]f digital small screen technology tends to disembody the subject, then in whites' big screen narratives, the black male body becomes the preferred object of this disembodiment" (285). If we extend this reading to the racialized female clerical worker of *Jumpin' Jack Flash*, we can see the same logic at play. Indeed, as Terry's extreme embodiment counters the disembodiment threatened by the machine, her femaleness and blackness mark her filiation to the subjugated secretary of the 1965 *Time* cover, to the feminized research department of *Desk Set*.

Things are slightly different for white clerical workers, especially those eager to succeed within established frameworks of power and authority. If Terry Dolittle has little interest in climbing the corporate ladder, *Working Girl*'s Tess McGill (Melanie Griffiths) wants badly to move from the typing pool to the office with a view. Tess is a big-haired, big-accented secretary from Staten Island, trying to work her way up Manhattan's corporate ladder through pluck, night-school upgrading, and elocution classes. Hers is a gendered and classed battle: having, as she says, "a head for business but a bod for sin," Tess is prey to sexualized workplace harassment in addition to a more general denigration of her abilities. *Working Girl* thus recalls earlier feminist-inflected workplace films, particularly *Nine to Five* (1980), and shows how things have changed. "Selfish, egotistical, lying, hypocritical bigot!" That's how working girls Violet (Lily Tomlin), Julie (Jane Fonda), and Doralee (Dolly Parton) describe their office supervisor, Franklin Hartt (Dabney Coleman) in the earlier comedy about the travails of being a woman in man's (work) world. Violet, Julie, and Doralee work in a secretarial pool, a large open office with tightly crammed desks and a rigidly enforced décor code: no plants, no pictures, no coffee cups. They describe this space as a "pink collar ghetto." The only computer in *Nine to Five* appears off-screen, and impedes the quick resolution of the bribery plot—head office is 'computerizing' and this is offered as a reason why it is unable to provide a crucial invoice to the branch office. If *Nine to Five*'s Violet was humiliated by constantly being asked to fetch boss Hartt's coffee, *Working Girl*'s Tess fetches toilet paper for her employer, trapped in the stall of the men's room to her great discomfort. *Nine to Five*'s Doralee was chased around the desk by her boss; Tess is literally pimped out to her boss's friend in the name of corporate advancement. More solidly into the eighties, though, Tess doesn't settle for simple dreams of revenge. Storming to her desk on the trading floor of the investment firm she works for after the disastrous 'business meeting,' Tess angrily keys text into her keyboard, deploying her business-school computer skills to exact her revenge: the digital ticker tape soon reads "David Lutz is a sleazoid pimp with a tiny little dick." Lutz, higher up the office hierarchy, and lacking such basic (or base) skills, cannot make the computer stop its insults, even though he frantically keys stop commands and rips the keyboard from the machine.

Securing a new placement as secretary to female executive Katharine Parker (Sigourney Weaver), Tess's fortunes seem to be improving. Katharine, however, is just as exploitative as any other boss—but goes one step further and steals Tess's idea for a corporate client. Tess discovers this deceit through technology: listening the Katharine's memo-tapes, Tess is led to a computer file revealing the theft. There are plenty of computers in the film: the trading floor is filled with so many of them that desk fans blow away the excess heat; secretarial desks feature them, executives have them in their offices and in their homes. Both Katharine and colleague/love interest Jack Trainer (Harrison Ford) have computers in their homes—contrasting the purely secretarial computing practices that were the norm earlier in the decade, executives in the later 1980s use the machine to model corporate finances, and to perform other spreadsheet and word processing tasks, replicating the implied corporate space of both the Apple and IBM ads. Tess gains access to her boss's life through the computer: address book, private memos, and corporate client files. She uses this information to impersonate an executive herself. Tess also uses other technologies to transform herself from working girl into female executive. Some of these are machine-based: she improves her vocabulary, idiom, and accent by repeatedly listening to her boss's memo tapes; she uses the telephone (and her newly mutable, sometimes bridge-and-tunnel, sometimes Manhattan accent) to convince callers she has her own secretary. Some are less so: Tess cuts her hair, borrows Katharine's wardrobe, tones down her makeup—she starts to look an awful lot like the depicted female computing subject of the IBM "My own personal computer" ad. As she becomes a more effective corporate machine, Tess becomes less of what she was at the beginning of the film, less visible as a classed (if not gendered; this is Hollywood film, after all) subject.

Importantly, Tess uses technologies to hide those markers that identify her as an inappropriate corporate subject—thus rendered 'invisible,' she is free to allow her inner talent to shine through. This is a particularly female use of the workplace computer; Terry Dolittle, too, is originally chosen as Jack's confidante because her name does not clearly mark her as female, nor as African American, two characteristics that militate against her possible success infiltrating the British embassy, for example. Within the formal, text-based system of the computer, Terry operates as a peer to bankers in Japan, France, and elsewhere, on a level playing field provided by the computer. Tess, for her part, uses the computer and other technologies to stand between herself and her intended audience, so that her 'head for business' won't be undermined by her 'bod for sin.' Computing and other workplace technologies allow these subjects to disguise their identities in order to advance where women and African-Americans had never been before. The situation is different in workplace films centred around white, male protagonists, who much more likely to deploy computers to purely instrumental ends: *The Secret of My Suce$s*, for example, sees Brantley Forster (Michael J. Fox) create a fictitious executive, Carlton Whitfield, simply by occupying an office and behaving like an executive: he has no need of elocution or fashion lessons, nor does he need to impersonate his own secretary when he can simply summon one to him. In *Wall Street*, too, Bud Fox (Charlie Sheen) uses a lot of computers, some in his home, to crunch more numbers and faster than he would be able to manually, but as he already carries the markers of Wall Street legitimacy (good suit, young, handsome, white) he does not need to disguise himself. Both films, though, do narrate come-from-behind victories for their characters: *Succe$s*'s Brantley Forster is a country boy new to the big city, and *Wall Street*'s Bud Fox has a airplane mechanic *cum* union leader for a father. Narratives of Manhattan upward corporate mobility constitute a genre unto themselves in the 1980s [49] The computer is an integral part of the workplace film of the 1980s, most overtly narrating its place in upward social mobility and an entrepreneurial meritocracy by operating in the service of traditionally underprivileged—working class, or female, or urban black—subjects. Such depictions have the corollary effect of minimizing the machine's perceived threat to more traditional white collar work, integrating it into workplaces in which talent ultimately triumphs over bureaucracy.

Conclusion

The integrationist representation of the personal computer, while it seeks to fit computing technologies into the practices and beliefs of Western culture, particularly referencing the patriarchal nuclear family and the meritocratic workplace, nevertheless must exert some rhetorical violence to achieve this end. Naming the new class of machines 'personal computer' enforces a link between the technology and an individual user/agent, but this was a process that proceeded over time: it was not natural, but constructed. Representations of the machine, as much as they work to blend the machine into the cultural landscape, are prone to excess, hyperbole, and even hysteria: consider IBM's use of the iconic Little Tramp, *Jumpin' Jack Flash*'s super-embodied computing heroine, or *WarGames*'s compelling figure of the lone-wolf teenage hacker. Over the course of the 1980s, however, the personal computer does come to be depicted conventionally, as in the *pro forma* creation scene in *Weird Science*, or the purely instrumental computer use in *Wall Street*, or even *Ferris Bueller's Day Off*. Computers come to seem fit for deployment in the home, most generally in the bedrooms of teenage sons, and in the workplace, in either the feminized clerical spaces or on the high stakes financial trading floor. They come to represent a potential for upward social and corporate mobility, and additionally operate as tools with which to combat calcified bureaucracies while extending the reach of personal agency. The integrationist mode of representation is arguably the most important means by which personal computing was broached, as it sought to fit the machine into hegemonic structures while still asserting the machine's newness; the integrationist mode, particularly in advertising texts, masks its operations as constructor of meaning in favor of seeming rather to reflect the already-true. Critical/dystopian works, by contrast, quite explicitly proclaim disjuncture from the known and the established, proposing a radical cynicism and a survivalist, post-apocalyptic aesthetic that centres on computing technologies, as we will see in the next chapter.

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[1] In a sense, these advertisements ask us to identify with the machines. Obviously, this is good branding strategy, but the identification transcends brand loyalty and amounts almost to a religion among some computer users. Most obviously, Mac users have become known for their blind devotion to Apple computers, construing competing hardware and software as evil.

[2] By the year 2000, of course, the pendulum has swung fully in the other direction, at which time the use of acronyms like 'Y2K' demonstrates savvy participation in the raging dot-com economy.

[3] 'Popular' here is a vexed term: the period in question saw the launch of several new hobbyist publications like *BYTE* and *CALL A.P.P.L.E.* that were started on a shoestring to respond to burgeoning public demand for information about small machines. Of course, these publications are 'popular' in a different way than such established magazines as *Time* and *Newsweek*. I will refer to these latter as 'general interest popular magazines.'

[4] The May 1777 article is reprinted at http://oldcomputers.net.byteappleII.html. The quoted sentence opens the article.

[5] The user manuals were written by Jef Raskin, philosopher and computer scientist, who later spearheaded the Macintosh development effort before being fired by Jobs (Levy, *Insanely Great* 109, 111).

[6] This bears elaboration. The phenomenally successful hobby computer offered by MITS—the Altair—received input from the direct manipulation of its memory registers. One had quite literally to input each bit by hand, by flipping what by all accounts were tiny and sharp little switches. Users had to 'speak Altair' and interact with the machine via its assembly language, about as low-level as you can get. Such efforts were rewarded with output in the form of LEDs that did or did not illuminate, again indicating the state of particular memory registers. Keep the Altair in mind when considering the innovative packaging of Apple II.

[7] Actually, in deference to this tradition, Apple also offered the Apple II as a hobby kit: "Apple II is also available in board-only form for the do-it-yourself hobbyist. Has all the features of the Apple II system, but does not include case, keyboard, power supply or game paddles. $798."

[8] This iconic link soon becomes exploited by companies manufacturing third-party peripherals and designing games compatible with the machine: Apple computers are referenced without recourse to trademarked symbols or phrases, but simply by the depiction of any sort of red apple.

[9] Blinkenlights, recall, is a hacker term for the LED display panels that constituted the most basic system output, where blinking lights correspond to activity in the various registers of the machine. The term is also used satirically, in a famous poster admonishing users in faux-German to stop touching the machines: "ACHTUNG! ALLES LOOKENSPEEPERS! Das computermachine ist nicht fuer gefingerpoken und mittengrabben... Relaxen und watchen das blinkenlights." The term, I feel, speaks both the machines and mindsets of a time predating the advent of the personal computer, and it is a useful means by which to reference the 'look but don't touch' era of computing priests tending massive machines.

In an interview with Steven Levy, reported in *Insanely Great*, Steve Jobs outlines his philosophy of simplicity and sophistication, indicating clearly that this ad tried to have it both ways: the simplicity standing for ease of use for the novice crowd, and for sophistication of design for those in the know (119, 138)

[10] This page, in both ads, also features the sidebar advertisement for the board-only Apple.

[11] The Apple had elegant insides as well as outsides: the circuit diagrams of the original Apple were so startlingly advanced compared to other machines that they were described as beautiful by Homebrewers. It is for board design that Steve Wozniak first earned his hardware-nut fame.

[12] My source for the ad does not date it—but as the Apple IIc was only released in 1984, I feel confident dating it near to that time.

[13] See the ad at: http://jupiterii.tripod.com/gallery/MiscAds/IIcspread.jpg

[14] IBM press releases, company documentation, archives and advertising all refer to the machine as "Personal Computer": later historical and journalistic treatments abbreviate this to "PC," and IBM itself uses this form in a later machine, the ill-fated "PC Jr." And the IBM compatible 'clones' of the Personal Computer have simply come to be known as "PCs." However, I see no evidence that at the

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time of which I write, the machine in question was referred to as anything other than "Personal Computer."

[15] For more on IBM's self-conscious use of logos to create a corporate character, see "From Globes to Stripes" in the online corporate archive, accessible at http://www-1.ibm.com/ibm/history/exhibits/logo/logo_1.html

[16] Third, of course, integrating a generic and widespread phrase like 'personal computer' into a trademark ensured that the same phrase deployed in other company advertisements and product lines would henceforth inevitably call up the image of IBM's machine. Like Kleenex.

[17] As with Apple's iconic logo, the Little Tramp figure also came to function as a shorthand reference to the company it represented in advertisements by other manufacturers ("Sorry Charlie," "How Sweet it is").

[18] It is probably worth acknowledging that IBM, comically downplaying the messianic appearance of the Personal Computer on the microcomputing scene, nevertheless fails to acknowledge the spur provided by other 'personal computer' makers.

[19] The acronym seems a bit forced. SCAMP stands for 'Special Computer, APL Machine Portable. At least the attempt at euphony in naming seems to indicate a will to make the computer seem less daunting.

[20] In what might be called 'bait-and-switch' by the uncharitable, or 'unbundling' by the euphemism-prone, IBM generally made it difficult for laypersons to understand their pricing, offering a plethora of configurations and leasing arrangements for each of their products. Williams, in a review of the Personal Computer, notes that IBM brings this innovation into the microcomputer market.

[21] Anne Machung's article in *Technology and Women's Voices* addresses this issue, as do the many issues of the *Processed World* zine, a San Francisco publication for temporary office workers highly critical of the new realities of clerical work. Some of this writing is available at http://www.processedworld.com

[22] The available software was: *EasyWriter* for word processing and text editing; a suite of applications from Peachtree for accounting tasks; *VisiCalc*, the spreadsheet program that was the 'killer app' driving initial sales of the Apple II as a business machine; and Microsoft *Adventure*, a text-based "fantasy world of caves and treasures" (IBM, "Personal Computer" 2). I find it important to note that Microsoft was here packaging a well-established game, commercialized from Stanford hackers Don Woods and Will Crowther's contribution to lab entertainment. *Adventure* was developed on the hacker-favorite PDP-10 (Levy 140, Ceruzzi 210, Freiberger and Swaine 168).

[23] Ted Nelson, in *The Home Computer Revolution* of 1977, is an early proponent of industry-wide standards, cannily understanding that interchangeability would greatly aid the new machine's spread through culture, parenthetically proposes that "[i]n the short term, the most important question is whether manufacturers will be smart and provide standardized interconnections, or be piggish and themselves lose by trying to keep their machines unpluggable to those of rivals" (158).

[24] This led to a lot of anxiety on the part of computer purchasers, one not entirely overcome to this day, that a lack of knowledge combined with pride leaves one open to exploitation by computer salesmen. This anxiety is spoofed in a 2000 episode of *The Simpsons*, entitled "The Computer Wore Menace Shoes," where the plot synopsis informs us that "[a]fter Homer realizes he's missed out on the computer revolution, he buys the nicest model a fifth mortgage can buy" (The Simpsons.com). The episode title, of course, is itself a spoof on the 1969 Disney family film *The Computer Wore Tennis Shoes*.

[25] Nelson and Englebart were both ardent followers of Vannevar Bush's memex ideal: Nelson sought to reconfigure humanity's relationship to information through a hypertext system (still in development) he named 'Xanadu,' while Englebart, in addition to pioneering the mouse, developed a 'chording' input system to replace alphanumeric keyboards. Both ideas are perhaps simply too different to catch one. Their efforts fall into the fantastic/utopian camp. Much more pragmatically, Cooper *et al.* note that "it appears that [QWERTY keyboards] will continue to dominate the field because of conversion and retraining expense. Therefore we will examine the IBM keyboard from within these standard constraints" (60).

[26] The hacker community at Stanford, with typical neologistic flair, devised a name for these extra keys: "bucky bits." Bucky bits are keys used to extend the range of keyable information, often used in finger-twisting combination (Ctrl-Alt-Del is a "triple bucky") (Steele *et al*, under "bucky bits").

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[27] Even the colours of the suit are right: while not the top picks, beige suits with maroon blouses are certainly acceptable business colours, and in any case photograph better than gray and navy.

[28] In point of fact, neither of machines depicted could be purchased for 'less than $1,600.' In his *BYTE* review of the Personal Computer, Williams notes IBM's practice of 'unbundling' the machine, or separating a system into individually-priced items: "although the component prices … look reasonable … the price of a susable configuration is somewhat higher" (37). The Personal Computer is, actually, more expensive (if more feature-rich) than the Apple II. The configuration pictured in "Dad, can I …" is best-guess (without seeing the RAM, for example) priced at $2,580 minimum. The "My own …" ad's computer is at least another $755, the price of the pictured printer. Neither estimate includes software referenced in the ads but not included in the price of the machines.

[29] Thumbnail reproductions of these ads can be found at http://members.cox.net/oldcomputerads/#ti

[30] Asimov did numerous ads with Radio Shack. Lesser known science fiction writer Gordon R. Dickson pitches 3M diskettes. William Shatner, crossing the genre/mainstream boundary, promotes the Commodore VIC-20 in an ad of January 1982. These ads can be viewed at http://www.oldcomputers.net/.

[31] The Commodore ad is located at http://members.cox.net/oldcomputerads/Literate.JPG and the Apple ad can be found at http://jupiterii.tripod.com/gallery/MiscAds/AppleII.jpg.

[32] Leary explicitly references Twain's lovable scamp, calling Lightman "the Tom Sawyer kid" (537).

[33] 'Social engineering is another term from the jargon file, and refers to the circumvention of security measures through the exploitation of the weaknesses people rather than machines: "the aim is to trick people into revealing passwords or other information that compromises a target system's security."

[34] 'Cracker' is another term from the jargon file, naming a person who engages in malicious, destructive, or illegal hacking activity.

[35] In point of fact, while the IMSAI pictured greatly resembles consumer boxes, the computer used in the film was actually special-ordered directly from the manufacturer. The original invoice, along with film stills, can be found on the IMSAI corporate website at http://www.imsai.net/images/provenance/wg_ship_8-3-82.jpg. Hilariously, the whole story of the company's association with the film is supplied; apparently, what verisimilitude the film's computing manifests is due entirely to the diligence of IMSAI employees. Not so hilariously, Freiberger and Swaine name the sale of this machine to the film as IMSAI's "last act" (351).

[36] Critics Edwards and Glass each suggest that the central dilemma in *WarGames* is the incapacity of the WOPR and its tenders to distinguish reality from games (Edwards 329, Glass 21; see also Kerman 197). Indeed, the film's promotional poster asks: "Is it a game, or is it real?" Above the tagline we see the NORAD control room, and below it David and Jennifer basking in the glow of a similar image on their computer screen. Video games structure the film and a strong link is drawn between arcade gaming and personal computing: David's turn at *Galaga*, his consumer desire for Protovision's new offerings, his hacker playfulness at trying to find a back-door into the company's mainframe, his hacks of the school computer, his glee at playing Global Thermonuclear War, the WOPR's dedication to constant game playing renamed 'simulation.' But it is not, ultimately, David and Jennifer who fail to distinguish reality from simulation, it is disillusioned scientist Falken, military technocrat McKittrick, and confused General Beringer.

[37] Kerman sees the WOPR's tenders as just as disconnected—similarly in thrall to the machine and unmindful of the human cost of their technological imperative (198).

[38] Steven Poole writes that "[g]enerally, if a movie shows a child playing videogames in his bedroom, the message is that this antisocial kid needs to get out more" (74). I don't think this is the case in *WarGames*, however. David uses his computer to engage with society in a more productive, more responsible, and more consequential manner than he had demonstrated in his 'real world' interactions with parents and teachers.

[39] If David's personal IMSAI is the military WOPR's counterpoint, David himself falls into necessary comparison with Dr. Stephen Falken, the WOPR's disenchanted creator. Dr. Falken, having lost his wife and young son (the 'Joshua' by whose name the computer comes to be called as the film builds to a climax) in a car accident, has given up all responsibility for his creation and retired misanthropically to a private island where he peevishly awaits the end of the world. In this he somewhat resembles the irresponsible Victor Frankenstein, disavowing his creation. Compared with Falken's pessimism and

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total lack of regard for the destruction about to be wrought by his own computer creation, David's precocity with machines and passion for life can't help but be read positively.

[40] For its part, the WOPR appears, initially, to fall into the scary-blinkenlights characterization: it hums ominously; it sits in its own room; it is tended by fussy and high-ranking experts; it has its 'finger' on the Button. As the film progresses, and its power revealed, the WOPR is also increasingly anthropomorphized: it becomes 'Joshua'; it speaks in a synthesized male voice; it asks to be played with. In the legacy system, to personify a computer meant to imbue it with ill-advised agency: remember HAL. In this case, however, 'Joshua'—as opposed to WOPR—is shown to be confused, to be following instructions, to be open to rational persuasion, to be able to learn (Edwards 330). Glass calls it "naïve" (21), and, indeed, the computer is named for a child. Glass suggests that the representation of computers in the film shows the Janus nature of the machines, with one seemingly sentient, out-of-control mainframe pitted agains a tame, instrumental extension of purely human will (21). Transformed from "WOPR" into "Joshua" through the intercession of a teenage boy and his instrumentally-deployed home computer, the monstrous, angential, warmongering mainframe is in its turn domesticated.

[41] If you *must* know, it's a Memotech MTX 512, with additional FDX unit attached. You're welcome.

[42] 'Typical' in the way that most denizens of John Hughes films are typical: rich and suburban.

[43] The VCR clock problem was both so common and so emblematic of the new confusing nature of consumer electronics that the whole class of problems associated with the learning curve of new machines is referred to by some as "the blinking twelve problem" (Stephenson). Pamela McCorduck nicely narrates this panic in an 'interlude' in her otherwise technophilic *The Universal Machine*: "it takes me the better part of the morning just to master the television, and hours of concentration for the videocassette recorder .... I'm shaken by how hard it is for me, which magnifies those anxieties one inevitably feels when faced with the novel and, of course, compounds my difficulties" (72).

[44] For more information on the gendering of clerical work, particularly typing, see Margery W. Davies, "Women Clerical Workers and the Typewriter: The Writing Machine" in *Technology and Women's Voices: Keeping in Touch* (Kramarae, ed.).

[45] This point of view is perhaps best captured in Processed World, an activist zine produced in San Francisco, which decried the dehumanization of the 80s clerical workplace.

[46] The computer featured in the movie is not a 'personal computer' *per se*, but rather a terminal of a much larger machine, and indeed, we learn early in the film that this terminal is hooked up to a global financial transaction network.

[47] The falling in love may be open to debate: certainly, while online, Terry proposes a dinner date with Jack. She dresses up for this date; he fails to attend. They finally meet in Terry's office, a neutral setting—much tenderness is expressed in vocal terms, there is some hand-holding, and hand-kissing, but nothing more. This may be due to racial politics trumping generic necessity: Jack is so white as to be pasty, and dreadlocked Terry has been loudly denouncing racist whites throughout the film.

[48] According to the Motion Picture Associaton of America, "[a]n R-rated film may include hard language, or tough violence, or nudity within sensual scenes, or drug abuse or other elements, or a combination of some of the above, so that parents are counseled, in advance, to take this advisory rating very seriously." See the website at: http://www.mpaa.org/movieratings/about/content5.htm

[49] See, for example, "The Yuppie Texts" in William J. Palmer's *The Films of the Eighties: A Social History*.

"The Sky Was the Colour of Television, Tuned to a Dead Channel"

Obviously, a cultural consensus that collectively 'reads' the computer as the ultimate instrument of personal freedom and democracy, or even as a sort of informational microwave oven, will bring about very different uses for the machine than will one which entails understanding computers as dehumanizing, alienating tools of totalitarian social control. The general tendency of the late 1960s and the 1970s was to adopt the latter stance; represented computers of the 1980s tended generally toward the former. However, legacy-inflected totalitarian computers continue to populate movies of the 1980s, in the action genre especially, but these machines serve different narrative purposes in the decade of the personal computer. Two of these purposes stand out. First, in critical/dystopian texts of the new decade, cynically-depicted mainframe computers are opposed to more neutral or empowering personal computers deployed to redress the imbalance between man and machine. Second, legacy-era technological trappings such as awesome blinkenlights displays and heavy technical jargon are employed in the construction of a new urban dystopian aesthetic, a bleak chic in which the dystopian and pessimistic materials of the 1960s and 1970s are reconfigured as the mise-en-scène for a gritty new personal-computing-enabled survivalist narrative. Many critical/dystopian computer movies of the 1980s manifest these traits, most notably *Escape from New York* (1981), *Blade Runner* (1982), *Brainstorm* (1983), *Terminator* (1984), and *RoboCop* (1987). In a British television movie and, to a lesser extent, in a subsequent American series, *Max Headroom* (1985) brought the bleakness and cynicism of these films to the small screen.

If the integrationst text embedded new computing technologies in a conservative and familiar setting to demonstrate the machine's seamless fit into existing social structures, critical/dystopian works foreground computing technology to de-familiarize their narratives, estranging and alienating readers and viewers by presenting future computerized worlds that are, at first glance, completely beyond the pale of human-driven culture. Famously, William Gibson opens his *Neuromancer* with the salvo, "The sky was the colour of a television tuned to a dead channel," setting the scene for a novel in which what remains of the 'natural' world can only be described in the prevailing cyberspace paradigm of reality inferred in that novel (1).[1] Scott Bukatman suggests that the "hyberbolic language" of Gibson's novel, like Jean Baudrillard's theoretical writings, "constitutes a new mimesis—it is a language of spectacle and simulation, a language designed to be appropriate to its era" (11). In this new mimesis, it is high technology that offers the figurative language to describe reality: the relationship of metaphoricity is reversed, and rather than using the natural to describe the produced, experienced reality can be legible only in terms of its relation of similitude to predominant and pervasive technologies. Thus, Peter Fitting notes that "Gibson's success lies in his poetics of the technoculture" his novel describes ("Lessons" 299). The "poetics of technoculture" Fitting ascribes to Gibson's novels marks the critical/dystopian category as a whole: the diegetic real or narrative universe presented in these texts is characterized by cynicism towards the present/future (these are often conflated) and abandonment of the past, by a capitalist ruthlessness so far as the public sphere is concerned, and by a generally instrumentalist view of the world, all wrapped in a dominating technological metaphor. For Claudia Springer, these "visions of the future extrapolate from our current cultural preoccupation with computers to create worlds where the computer metaphor for human existence has triumphed" (720-1). The central opposition between machine-logic and human culture that so defined materials in the legacy era has disappeared in this decade's work: in the new mimesis of the critical/dystopian text, machine logic and human culture are indistinguishable.

The technoculture articulated in critical/dytopian texts can be quite bleak, and in some ways carry on that pessimistic vision of the future that H. Bruce Franklin diagnoses as characteristic of science fiction films of the 1970s. Of the films from that period, Franklin claims that "not one … shows a functioning democracy in the future. Many display future societies ruled by some form of conspiracy, monopoly, or totalitarian apparatus" (22). Franklin specifically names George Lucas' *THX 1138* (1971) as emblematic of this trend; this film describes a highly computerized, perfectly rational, colourless future society. Film theorist Robin Wood summarizes

1970s-era filmmaking as manifesting "a crisis in ideological confidence … visible on all levels of American culture and variously enacted in Hollywood's 'incoherent texts,'" a crisis which by the 1980s "has not been resolved: within the system of patriarchal capitalism no resolution of the fundamental conflicts is possible" (162). For his part, William J. Palmer describes rampant fear of The Bomb as a sort of paranoid ground tone humming through the decade: "The eighties, like the three preceeding decades, always had the nuclear war issue in the forefront of its social history" (179). Palmer notes that, unlike the prior three decades, the 1980s had the nuclear issue thrust front and centre by domestic nuclear power crises like the accident at Pennsylvania's Three Mile Island plant in March of 1979 (179). Further, "[t]he increase in nuclear war consciousness in the eighties coincided with Ronald Reagan's ascent to the presidency and his eight years of hawkish saber rattling and arms racing" (180). Hollywood, Palmer observes, not only saw many of its luminaries become anti-nuclear activists, but also witnessed a reversal of a trend in filmmaking which had, since the later 1960s, ignored the nuclear issue in its narratives (181). Along with the real threat of nuclear conflict or disaster that Palmer proposes as a strong influence of Hollywood, Wood identifies a number of other social crises these films worked through and against. Among these he numbers "radical feminism, black militancy, gay liberation, [and] the assault on patriarchy" (Robin Wood 163), as well as the economic depression of the decade and the technomilitary disaster of the Vietnam war. Wood suggests that these crises are elided in 1980s filmmaking by a rush to fantasy, which we will address in the next chapter: I argue here, though, that in a corollary gesture attending the rush to fantasy, in another set of texts, the very substance of the threat—rampant militarism, Cold War nuclear brinksmanship, economic depression, a social structure rocked to its foundations, in a context of sweeping technological change—is recuperated as the background conditions for a new kind of (anti)heroic subjectivity.

This subjectivity, and let's call it 'cyberpunk' for the moment, is just as cynical, implicated, and technologically-mediated as the structures which oppress him. In the early part of the decade, this subjectivity is set in a post-apocalyptic technological wasteland where all advanced machines—big computers, little computers—have lost their sheen: this trend is inaugurated with films like John Carpenter's *Escape from New York* (1981), which narrates a near-future United States in which war heroes go to prison and wardens are criminally duplicitous, and where vast tracks of America are barely contained in sustainable chaos by awesome repressive weaponry, undergirded by the near and present danger of catastrophic nuclear conflict. Nuclear conflict—imminent, underway, or recently passed—undergirds many critical/dystopian narratives. Palmer nominates *The Terminator* (1984) as "an overlty nuclear parable" because its time-travel narrative telegraphically depicts high-tech capitalist cause and apocalyptic dystopian effect: the movie's "opening future sequences protray a postnuclear holocaust world of totalitarian repression, troglodytic life, and graphic high-tech violence.... [T]he film [also] portrays an eighties world of innocence and incredulity" (185). For Palmer, the constitutive irony of the film is that it is "the Cyborg villain that declares it is our technology that will turn upon us and ultimately destroy us" (185). The overarching theme? Survival (185). For Franklin, the links between near-future dystopias and contemporary society are obvious: "Of couse [these films] mirror the profound social decay we are experiencing. Obviously some of them are also meant as warnings" (31). As the 1980s progress, however, we see this dystopian setting and survivalist subjectivity clean up: cynicism and techno-gear meet MTV, and the result is Max Headroom, a made-for-TV, computerized talking head, who, while operating in a corporatized technodystopia that recalls the post-apocalyptic *Blade Runner*, dresses in dapper digital threads, cheerfully pitches soda-pop, and cracks ironic one-liners to the cynical delight of viewers. Innocence, or at least, incredulity, thus win out, and critical/dystopian texts begin to be marked by harsh technocultural settings evacuated of political critique.

However much the critical/dystopian film of the 1980s may maintain the pessimistic tone of the 1970s works, often representing large computers in some of the same ways, the decades' oeuvres diverge in their assessment of the scale, nature, and impact of the computerization of culture. The critical/dystopian texts of the 1980s do not so obviously pit the human against the machine as did earlier works, figuring instead worlds pervaded by large and small computing technologies, worlds in which the power balance between the forces of monolithic evil and individualist good shifts on the basis of the blunt technological force of the one deployed against the guerrilla technological skills of the other. Critical/dystopian works, like the integrationist, distinguish between the personal computer and the legacy computer of the earlier century: however, rather than proposing a fundamental qualitative difference between the two classes of machines, whereby one is scary and one is friendly, these texts show a difference of scale. One powerful mainframe machine is used by 'the system'; another smaller machine is used by the antihero. All the diegetic technologies are points on a continuum and thus it is often difficult to point precisely to a discrete personal computer. Nevertheless, the accumulated heft of this mode of representation added bulk and shape to emerging discourses of personal computers, personal computing, and the computerized cultural context generally, in ways quite specific to the personal computer age, in which all subjects were exhorted to join the revolution. Particularly, this mode resembles the others in proposing individualized forms of computing as a response to the excesses of insitutional computing. In these 1980s critical/dystopian texts, though, style is paramount: cynicism gains a hip, edgy 'look,' and critical/dystopian works are aesthetically branded in the manner of visually recognizable consumer products.

Over the course of the decade, critical/dystopian visions of individual computing move from survivalist bleakness to consumerist chic-ness, a move that, if nothing else, shows the remarkable capacity of capital to recuperate critiques of itself into opportunities to consume. Nevertheless, by decade's end, the critical/dystopian mode of representation continues to allow for the articulation of pointed—if ultimately ambivalent—critiques of this culture, as in *RoboCop* (1987). It is perhaps owing to this critical function, or perhaps again owing to the mode's deliberate articulation of a coherent aesthetic often linked to works of postmodern theory, that the texts falling under the critical/dystopian rubric are among the most-studied and best-known of all the texts under examination in this dissertation. Cyberpunk fiction, especially, as well as *Blade Runner*, have been subject to extensive critical dialogue based in aesthetic evaluation and cultural explication. Films like *RoboCop* and *Terminator* are similarly well-studied, for their cyborg constructions of posthuman subjectivities. The analysis of the critical/dystopian personal computer presented here, then, will proceed chronologically. It will show that as the decade progresses, the critical/dystopian mode references and remediates legacy computing representations, keying their technological dystopias to contemporary social and political concerns like the fear of nuclear conflict and the disintegration of traditional social structures—this chronology is not, of course, meant to articulate a totalizing, step-by-step linear progression of the mode from its beginnings to its perfection. Rather, these chronologically-organized readings of individual texts map a general trend in ways I find both illustrative and helpful, a trend away from clearly legacy-inflected dystopias to a survivalist vision more in keeping with the (individualistic, materialistic) tenets of the era of personal computing

Escape From New York

John Carpenter's *Escape From New York* (1981) is a transition text bridging the gap between 1970s pessimism and fear and 1980s-style technological excess and critical/dystopian depictions of computer-enhanced societies and their anti-heroes. Presaging the trend of the decade, *Escape from New York* moves the dystopian future much closer to the present day than does *The Time Machine* (800,000 years hence), or *Logan's Run* (several hundred years, in the "23rd century"). The film's thrust is well-summed up by its tagline: "1997. New York city is now a maximum security prison. Breaking out is impossible. Breaking in is insane." The opening sequence of the film presents a retrospective look at a 'then' of 1988—the historical future relative to the film's 1981 release date—leading into the 'now' of the diegetic real, a projected 1997. In "1988," according to this short sequence, lawlessness was rampant in the US, with the narrator intoning that crime indeed has increased "400 percent," presumably relative to the extradiegetic 1981 of the film's release. The island of Manhattan is isolated and run as a prison. It is surrounded by concrete fence, and its bridges and rivers are mined and patrolled; its inmates are left completely to their own anarchic devices. The prison is adminstered from the ironically located "Liberty Island Security Control," a military-styled command and processing centre. New inmates arrive at the island en route to the city/prison of Manhattan, a fate so grim that they are given the option to opt for euthanasia and onsite cremation rather than incarceration. Early in the film two prisoners on a raft are shown trying to escape: they are blasted from the water by a rocket-launching police helicopter. We see one particular new inmate proceed through the process of incarceration, the swaggering 'Snake' Plissken, following the road to hell as it is marked out by the orange line he is electronically advised to follow. He is shackled and surrounded by armed and helmeted guards; he is soon to become the film's hero.

Viewers are introduced to the New York of 1997 via textual intertitles, computer graphics, and a modulated female narration reminiscent of the phone company's recorded announcements.[2] These devices lend a sort of 'technofuturistic' tone to the film. The city's barriers are technological as well as geographical, as befits the dawning computer age. The Liberty Island command centre is bedecked in blinkenlights, uselessly if ominously glittering behind head honcho Bob Hauk as he barks orders to underlings who type away at banks of legacy-era terminals. Larger and more pervasive technologies include the helicopters and advanced weaponry the police deploy to control the prison, their space-age protective suits, and their use of satellite phones and computer-monitored perimeter controls. Computer modelling also plays a key stylistic (if not narrative) role: modulated voiceover accompanying wireframe graphics introduce both the film's geography and its technology; an engineless black glider is guided into the prison/city by computer models of the night city; officers are shown sitting at military-style computer consoles. The initial impression is of a techno-state holding back the chaos of an urban space given over to lawlessness. Clearly, all is not well in the 1997 imagined in *Escape from New York*: first and foremost, the financial centre and urban-cultural heart of the United States has been converted to a prison, and a particularly vicious and hopeless one at that, where even the platitudes of rehabilitation have been abandonned. The outside world may well be in worse shape still: the command centre is soon rocked by the revelation that an out-of-control aircraft heading into the prison is actually a hijacked Air Force One, under the control of a female terrorist claiming to act on behalf of "workers" organized into a syndicate against the "imperialist, racist police state." The president is bundled into an escape 'egg' of sorts and survives the crash, only to be immediately taken captive by NYC inmates eager to use him as a means of effecting their passage out of the prison. Beyond the clear imperative to retrieve their head of state, prison officials are under another time pressure as well: it appears the President was on his way to a nuclear summit with Russia and China, to deliver a cassette-recorded goodwill message laying out the processes of nuclear fusion. The summit is apparently meant to end a nuclear war currently underway: the very future of humanity is imperilled by the disappearance of the President and the tape. The social universe depicted in the film then, is a nuclear dystopia, crime-ridden, ravaged by war, and techno-authoritarian in nature. William Palmer thus numbers the film among the nuclear war texts he groups in his analysis of 1980s cinema, for its action "set … against this backdrop of post-apocalyptic survival" (205).

The incapacity of the structures of authority to navigate the chaos of the prison is soon apparent. An early attempt by police forces to rescue the President results in an ignominious and hasty retreat: no number of helicopters, guns, and military precision can effectively combat urban guerrillas with nothing to lose. Commander Hauk hits upon another plan: he recruits Plissken as a commando. Plissken, a futuristic Rambo of military precocity, is the youngest President-decorated war hero in the US, famous for daring incursions into Russian air space as a fighter pilot. For unexplained reasons, Plissken has turned to armed bank robbery, thus earning his passage to the island. As Hauk threatens a soon-to-be-exiled Snake, incarceration on Mahnattan means total and permanent banishment: "I'm ready to kick your ass off the world." However, in light of Snake's military and street skills, and his own force's incapacity to rescue the nation's political head, Hauk offers Snake total pardon if he can enter New York, retrieve the President, and get him out of the city within 24 hours—the time he is supposed to appear at the summit. Plissken is unmoved by Hauk's news; he is very unpatriotic for a former soldier, going so far as to claim "I don't give a fuck about your war, or your president." Soldier for hire, he is ultimately enticed by the promise of exculpation, and then coerced by the implantation of literal timebombs into his bloodstream. Snake is out to save himself: he professes himself no fan of American politics of politicians, and vows to come back to Liberty Island to kill Hauk. Snake is the anti-hero of the piece, a guerrilla techno-rebel with street credibility who circulates as a lone wolf among the inmates of the prison, all of whom recognize his name, and some of whom pick him out of crowds. All mention that they believed him to be dead, another index of Snake's move beyond the pale of society. An array of digital gizmos, mostly communications and surveillance technologies, add a computer-age sheen to the action: a wrist-carried tracking device, a wrist-carried life signals monitor and homing beacon, a handheld 'president tracker,' all support the quest narrative that develops.

Escape from New York offers an ambivalent view of technology and authority in a thoroughly negative and dark future. Following the example of *Planet of the Apes* and *Logan's Run*, the poster for *Escape from New York* posits a (near)-future dystopia in which contemporary cultural monuments are reduced to rubble or, worse, illegibility and irrelevance. The promotional posters for the American cinematic release show a literally off-kilter Manhattan. In one poster, the head of the Statue of Liberty occupies the centre of the frame, the sole well-lit aspect of the piece. In the far background, the Chrysler building is shadowed and lopsided, an icon of Manhattan style and modernist aesthetic sacrificed to science fiction dystopianism. Lady Liberty is decapitated and defiled; the Chrysler building overlooks urban chaos. The foreground of the poster depicts fleeing human figures amidst rubble. The poster's point of view is rooted somewhere below ground level, an angle which, combined with the tilt previously noted, offers a perspective at once heroic and anxious. It is catastrophe and reversal on a monumental scale, and it links the diegetic nightmare to the contemporaneous real. It presages the generic tropes of the emerging critical/dystopia mode of representation by its political cynicism, its violence, its pervasive computing technologies (both large and small), and in its articulation of a new, radically individualist anti-hero that seeks not to change the world for the better, but merely to survive it.

Blade Runner

Blade Runner (1982) is an important critical/dystopian text, despite its paucity of computing machines relative to the other texts under examination in this chapter. Its value lies in its careful delineation of a near-future dystopian technoculture clearly linked to contemporary social concerns, a style widely imitated and admired. Thomas

Byers, reading the film along with *Alien* (1979) and *Star Trek II: The Wrath of Khan* (1982), claims that *Blade Runner* "see[s] a specific kind of value system and personal style as emerging from large-scale corporate capitalism" (49). Byers finds it "significant that all three [movies] appeared during the explosion of popular interest in computers" and that *Blade Runner* and *Wrath of Khan* were produced during the Reagan and ascendant-yuppie eras, finding these cultural factors to strongly influence the films (39). A difficult film—difficult to finance, to produce, and to film; difficult to understand for some; and difficult to enjoy for many—Ridley Scott's revisioning of Philip K. Dick's novel *Do Androids Dream of Electric Sheep* (1968) continues to come into its own as a cultural text. *Blade Runner*'s story, at base, is simple enough—Deckard (Harrison Ford), the hero of the piece, is supposed to track down and kill criminal fugitives, four Nexus-6 replicants, organic robots designed for offworld slave-labour, who are nearly indistinguishable from humans. In this case, the devil is in the details: the excessive detail of mise-en-scène and art direction, and the accretion of narrative detail hung on a frame that only gains shape from accumulation. As with cyberpunk after it, *Blade Runner* is short on exposition and long on devices that estrange it from the extra-diegetic 'reality' of viewers. The film makes pretty strong demands on its viewers, who must get up to speed, as it were, via their own sense-making processes. A box-office failure on its initial release, *Blade Runner* was denounced by audiences and critics alike for its sloppy storytelling, its bleak outlook, its inconclusive ending, and its apparent abandonment of narrative coherence in favour of style.[3] Each of these 'failings,' though, can be understood in the context of the film's work as a founding text in the fledgling critical/dystopian genre of the 1980s.

For Robin Wood, what distinguishes Scott's film from Dick's novel is that the book's "concerns … are predominantly metaphysical, those of the film predominantly social" (183). Indeed, Guiliana Bruno nominates the film as "a metaphor of the postmodern condition," which the film examines in terms "of questions of identity and history, of the role of simulacra and simulation, and of the relationship between postmodernism, architecture, and postindustrialism" (184). Like Scott's later "1984" Apple Macintosh ad, *Blade Runner* is visually stunning, offering what production historian and critic Paul Sammon calls "addictive eye-candy" and "ultrasophisticated 'designer cinema'" (3). The prizing of the visual—scenography, gadgets, an overall aesthetic—is entirely in keeping with the narrative's thematic emphasis on the visual that several critics have noted. This thematic emphasis, in turn, is related to what Guiliana Bruno calls the film's "architectural pastiche," the dense layering of durable and ephemeral, monumental and decrepit elements of the 'Ridleyville' locations (187). For Bruno, the environment of the film "produces an exhibitionism rather than an aesthetics of the visual" (187)—it is all about looking and seeing.[4] Sammon goes so far as to conjecture that *Blade Runner* is "the first $30 million mainstream science fiction art film, if you will" (7), a movie whose look immediately sparked "dozens of look-alike" narratives (6). Identifying her primary critical orientation as influenced by architectural writings on postmodernism, Bruno understands the film to address questions not only of what it means to operate as a human subject in a technodystopia, but also of what such a dystopia might be grounded in, what its founding conditions might be, what it might look and feel like in material ways.

Notoriously richly detailed in set design and stark in exposition, the 700-layer layer cake that is *Blade Runner* is a film that repays multiple viewings—perhaps demands multiple viewings. As one critic notes, "*Blade Runner* is one of the most fully realized visions of a future society ever set on film, and repeated viewings are an absolute necessity if one wants to catch the multitude of design flourishes littering every frame" (Sammon xvi).[5] Much has been made of these visual flourishes, the littered frames, the gorgeous 'period' detail. The flip side of such remarks is an implied or explicit critique of the story or the characterizations, which we might sum up as the "looks versus substance" debate. The terms of this polarization bear examination, as they reveal precisely the tension that makes *Blade Runner* such a powerfully ambivalent text of the 1980s. The 'style' opposed to substance is taken to comprise *Blade Runner*'s layered set design, its stylized character dressing, its use of dialogue deployed as atmosphere rather than exposition (as in Gaff's 'cityspeak' an incomprehensible amalgam of natural languages that must be translated [Sammon 115]), and its obsessive attention to details of production design. The 'substance' seen to suffer in the film is similarly sweeping: the story was incomprehensible, the characters unlikeable, the ending too abrupt and without adequate closure or resolution.[6] I have no desire to write a fandom-based apologia for the film; nevertheless, it is not difficult to construe these criticisms as arising from the success of the film as dystopian text, rather than from its failures as Hollywood blockbuster. These are, after all, separate categories of legibility. Paul Edwards reads the film as consitituting a system, as performing a systemic interrogation of the values of what he names the 'closed world' of later twentieth century Cold War politics. This system, as in other closed-world texts, is "constituted in and through metaphors, technologies, and practices. The metaphors are information, communication, and program; the technologies are computation and control; and the practices are abstraction, simulation, engineering, and panoptic management" (340-1).

After an opening weekend take of $6,150,000 across roughly1290 screens, *Blade Runner* fizzled at the first-run box office (Sammon 309, 316, *IMDB*).[7] As a summer blockbuster, *Blade Runner* certainly missed the mark, as these poor box office returns indicate. Nor was the film without technical and narrative flaws: there are several factual inconsistencies, resulting from rewrites while shooting, and several other glaring moments of shoddy production resulting from budget and time constraints, as well as re-edits, most notably in the final scenes of the film, where a dying replicant Roy Batty releases a white dove into the rain-drenched night sky, and the cutaway reveals the dove flying happily upward into the sun on a cloudless and bright day. A couple of shots are reversed and re-used in the film to make up for holes left in the re-editing process(es).[8] "Lip flap," a visual/aural mismatch where actors' lip-movements fail to match spoken dialogue, are also evident in the film, the result of rewrites far into the post-production work that sometimes reversed the original sense of shot dialogue—for example, when Rachael originally assures Deckard that the Tyrell owl is real ("Of course it is") but later overdubbing instead claims "Of course not" to avoid a narrative inconsistency. In other scenes, characters mis-identify the number of replicants on the loose, and some narrative threads (like Gaff's unicorn origami) are inexplicably dropped. These elements add to the complexity of the film, and to the perplexity of its audience. By all accounts, director Ridley Scott micromanages his shoots, carefully storyboarding and planning all shots and cutaways: the mash of inconsistencies and technical booboos speaks to the real conflicts over the direction, atmosphere, tone, and even story arc of the film among the producers, the director, the distribution company, and the preview audiences. Despite these real flaws, *Blade Runner* nevertheless presented a powerful and evocative 'future noir' (to borrow Sammon's title), and some of the film's narrative opacity, I feel, can be attributed to the film's success as an ambivalent dystopia, a critical/dystopian response to the emerging technocultures of the 1980s, rather than its failings. As Scott Bukatman expresses it, "[s]cience fiction constructs a *space of accommodation* to an intensely technological existence," however uncomfortable this space might be (11; emphasis in the original).

Sammon contextualizes the film's release by noting its competition: *Blade Runner* was released in the same period as *Star Trek: The Wrath of Khan*, *Conan the Barbarian*, and *The Thing*, films that offered science fiction and special-effects thrills with conservative plots and conventional presentation. Worst of all, *Blade Runner* went head to head at the box office with Speilberg's treacly *E.T. The Extra-Terrestrial*.[9] It soon became apparent that audiences in the summer of 1982 vastly preferred their visitors from off-world to be childlike and loving, not murderous and ambivalent. Robin Wood explicitly juxtaposes information from the two films, beginning his reading of *Blade Runner* by noting that following their twinned release, "receipts for *Blade Runner* dropped disastrously while those for *E.T.* soared," that critical and popular opinion, and the opinion of the Oscar-voters, turned toward Speilberg's text and away from Scott's (182). For Wood, this choice "expresses a preference for the reassuring over the disturbing, the reactionary over the progressive, the safe over the challenging, the childish over the adult, spectator passivity over spectator activity" (182). Viewer confusion, estrangement, and intuitive self-reliance are a deliberate effect of the film, as it is of cyberpunk after it, a narrative that places the viewer/reader in a similar position as the work's protagonist: navigating through a strange, bleak, world with only partial knowledge, dystopian heroes and the audience alike must make it up as they go along, seemingly coping with crisis after crisis rather than proceeding from crisis to *dénouement* in the ordinary manner of Hollywood narrative.

Wood writes that "[t]he more often I see *Blade Runner* the more I am impressed by its achievement and the more convinced of its failure" (187). Wood surmises that the film's "unsatisfactoriness" is a necessary result of the fact that "the central thrust of the film, the source of its energy, is too revolutionary to be permissible: it has to be compromised" (187). This compromise inheres in "the ludicrous, bathetic ending," (Robin Wood 187) which Byers describes as a "retreat[] from the implications of its radical criticque into filmic clichés and individualistic solutions" (45)—the retreat is from the film's early "insistence on the dehumanization necessary for human survival in a world dominated by mega-corporations" (45). The original cinematic release of the film featured an ending in which blade runner Deckard and replicant Rachael escaped the post-nuclear city for the sylvan countryside, a unexpected and implausibly happy, heteronormative ending that claimed that an unlikely couple in the throes of romantic love could escape the systemic strictures so deterministically operating on their lives in the rest of the film. As Paul Edwards writes, "[t]he heterosexual couple finds again the transcendent reunification of man with woman and human with nature" (346), despite the fact that, as Byers suggests, "the overall effect of the tale is to indicate that the identifying characteristics of humanity … would be so drained away as to deconstruct more or less thoroughly the traditional human/robot … opposition" (44). This effect, ultimately, is mitigated by the muddled narrative arising from the mutually contradictory imperative of Hollywood endings and the depiction of plausible dystopias. Despite its failings, and its retreat from the most radical of the critiques it offers of late-modern culture, *Blade Runner* offered a rich aesthetic language in which others could attempt the same project.

Neuromancer

A similar guerrilla ethic in the face of a totally technologized near-future pervades cyberpunk literature, the decade's main contribution to the evolving canon of science fiction: this body of work manifests an increased thematic and rhetorical reliance on computing-technologies, as the title of this chapter makes clear. Rhetorically, cyberpunk novels depend on computer-based imagery and metaphor to narrate the future societies they imagine. Thematically, the computer rarely functions as an object of wonder in this genre, appearing much more often as a banged-up, thrown-together, necessary tool of postmodern survivalist living. *Neuromancer*, and to a lesser extent, its sequels *Count Zero* (1986) and *Mona Lisa Overdrive* (1988) have been linked, in Rob Latham's equation, thus: "cyberpunk == *Neuromancer* == Gibson," a formulation rightly noting the conflation of Gibson's text with the cyberpunk ethic/aesthetic in most critical minds. Indeed, a fair amount of academic ink has been shed in analyses of Gibson's cyberspace trilogy. Several critics have pointed out that Gibson's work is about the now rather than about the future (Gibson himself asserts this in interviews every time he gets the chance), that he takes cultural anxieties about the death of the self and the ascendence of technology and integrates this into a fundamentally humanist frame, easily packaged into the format of the realist quest narrative. Most critics agree that Gibson has a gripping vision of the future, and that he brilliantly captures the anxieties of postmodern moment of the 1980s.[10]

The novel tells several stories: first and most centrally, cyberspace cowboy Case is on a quest to regain the bodiless exultation of access to the digital "consensual hallucination" that is the global networked computing space. He has been mutilated by a former employer from whom he had tried to embezzle funds. At the novel's outset, he is surprised to be recruited by shadowy persons to re-enter cyberspace to do a job for them: they have the technology to heal the wounds that prevent his access. Case is assisted by Molly, a razor girl—surgically-enhanced hired muscle—who has mirrored optical implants that permanently hide her eyes, and retractable blood-red razors at her fingertips, among other innovations that make her physically dangerous. Molly and Case, it transpires, are working to reunite two separated artificial intelligences—two computers—who have attained sentience and seek reintegration. Such a summary does not do the novel justice, as it is a thing to be experienced rather than described. In the novel, as Claire Sponsler notes, technology "provides the dominant paradigm for the mediation of reality" (628). Metaphorical innovation notwithstanding, Tom Moylan feels that, in *Neuromancer*, Gibson "sought refuge in recognizable film noir polts and macho heroes already embedded in the dominant ideology" and this is a "symptom of the tactical compromise" that characterizes cyberpunk as a genre from its very outset (184). Examining the effects of cyberpunk on both science fiction and mainstream reading habits, Samuel Delany sums up the place of cyberpunk in popular culture *circa* 1985: "Cyberpunk is that current SF work which is not middle-class, not comfortable with history, not tragic, not supportive, not maternal, not happy-go-lucky" (33). Delany downplays the revolutionary aspects of the genre, claiming that whatever iconoclasm the new genre might have manifested was coopted as canny marketing technique. He points particularly to a [redacted] *Rolling Stone* cover story on this fiction, after which he feels "cyberpunk becomes something between a disaster and simple idiocy" as a result of overpopularization ([redacted]).[11] Delany compares the *Rolling Stone* and other popular rhetorics of cyberpunk to the popular discourse on deconstruction: both discourses are complicated and context-bound, better read in the aggregate than in the individual, but are easily taken up in exemplary form and thus misunderstood in the popular areans ([redacted]. Another danger of the working definition of cyberpunk that Delany formulates above is its incipient nihilism. Delany writes, "it's only as a negative—and a negative that's meaningless outside of the past tradition and current context of SF—that 'cyberpunk' can signify" (33).

Cyberpunk author and literary critic Norman Spinrad coined the term 'neuromantic' to describe a philosophy best demonstrated in *Neuromancer*. "Neuromantic" texts, heroes, and authors are rebellious, rabidly technophilic, decentred subjectivities; they are the pioneers of postmodernism, switching between gritty street life, the pure electronic *jouissance* of cyberspace, and hand-to-hand combat, to achieve transcendence of the limits of human Being. Obviously, this constructed subjectivity draws on the Romantic tradition; neuromantic texts feature, in this particular way of thinking, elements of the Romantic sublime, and elements of Gothic terror. They are populated by lone, maverick heroes who seem to belong both everywhere and nowhere at once. For David Mead the adjective calls to mind the ideas of "egregious individualism," "defiant self-reliance," "radical technological change," and a "rebellious rejection" of social constraints (350). Neuromantic heroes tend to be, it bears saying, white, middle-class, male, and very American; they seek not spiritual enlightenment but power, not dissolution in the great scheme of things, but absolute transcendence of the physical body and the freedom of movement such a transcendence would entail. In this school of thought, cyberspace represents for cybernauts what the infinity of the heavens represented for the Romantics (and those who came before them): it is an infinity incalculably big, paradoxically limitless and void. Whereas seventeenth- and eighteenth-century conceptions of infinity diminished the fearsomeness of this vision by using it as proof of God's divinity, cyberspace-as-infinity is more-than-mundane, it is corporate, it is constructed by human hands for the visualization of capital (Voller 19). Similarly, while spiritual adventurers of earlier times sought proximity to the Divine through a proximate experience of infinity (cf, Manfred on the mountaintop in Byron's closet drama of that name), the neuromantic eschews mediation and experiences it firsthand, immersing himself into cyberspace, and approaching, in this case, not the Divine, but the corporate. According to Mead, this neuromanticism is a "forthrightly high-tech romanticism," an attitude that embraces "wholeheartedly the real world that science and technology have made, the technosphere, the reality of the last quarter of the twentieth century" (350) in a remarkably un-sublime formulation. For Jack Voller, the awe of the sublime is evacuated in the neuromatic impulse, not only by "denying [the sublime] any aura of metaphysical consequence, but also by converting it into a quest for the material" (25). In this manner, "[t]he infinite has here been casually yet compellingly dismissed" (Voller 21).

Neuromancer is peopled with characters that defy or deny the boundaries between machine and human, rendering nonsensical legacy-era concerns about the incompatibility of machinic and human cultures. The novels implicitly address larger questions of social meaning by domesticating truly alien technologies into recognizable, pleasurable narratives. For Brande, then, "what Gibson's characters 'represent' is not the reality of subjectivity within late capitalism, but the fantasy that governs the production of that subjectivity—the 'interpellation' of the cyborg" (97). This interpellation, utlimately, is commercial. Sponsler summarizes the novel's effect: "Glitzy, hip, slangy, and decadent, the object world of Gibson's fiction draws us irresistibly, the punk-trash style beckoning enticingly. Gibson gives us a narrative version of our postmodern consumer culture that, not surprisingly, engulfs us just as inexorably" (631). Gibson's fictions circulate as culturally powerful ideologies of technology-in-life: his dystopian visions, packaged so attractively, seduce the reader into desiring the undesirable, a loner subjectivity in a post-nuclear society organized as global market. Indeed, David Brande considers *Neuromancer* "an ideological fantasy of crucial importance to advanced capitalist society" (81). Bruce Sterling, also, notes that cyberpunk is a 'brilliant' mash of 80s pop culture and technology speaking as much *to* the lived moment as *about* the possible future. For Brande, similarly, *Neuromancer* "stag[es] ... the modes of symbolization characteristic of a technologically advanced capitalist society" (80). More pessimistically, perhaps, Glenn Grant notes that "[m]ultinational corporations are seen to flourish on the co-optation of the human need to transcend the self" (46). Many of the words and ideas formulated in Gibson's *Neuromancer* entered the vernacular and the public imaginary—and the capitalist marketplace—most notably the term and concept "cyberspace." Tom Moylan thus claims that "the cyberpunk imaginary extended beyond the genre into the crevices of popular culture, into the computer industry itself, and ... into the very conceptualizations and operations of the postmodern cybernetic military" (185).

Max Headroom: 20 Minutes Into the Future

Perhaps best known as a wisecracking pitchman for Coke in North America, 'Max Headroom,' the stylized, jumpy, computer-age talking head with the sly grin, skinny tie, and oversized Ray Bans, made his début in a dark television movie produced for Britain's Channel 4 in 1985. *Max Headroom: 20 Minutes Into the Future* tells the story of a fictional television station, Network 23, and its star reporter Edison Carter. Engaged in a constant and vicious battle for ratings and advertising money, Network 23 introduces 'blipverts,' high-speed, visually and aurally dense advertisements compressing the traditional thirty-second spot into three seconds. The intensity of the ad, however, can trigger electrical short circuits in the more sedentary human body, leading the occasional viewer to literally explode in front of the television. As the film opens, reporter Carter is racing to the scene of one such incident, only to be called off the story by network executives. Refusing to drop his enquiries, Carter, assisted by his 'controller' (a sort of technical producer) Theora

Jones, continues to seek the truth withheld from him. An attempt on the reporter's life by network-employed computer *wunderkind* Bryce Lynch results in Carter's brain being downloaded into a computer, which then simulates the reporter as the character which later comes to call Max Headroom. The computer in which Max 'resides' is subsequently deposited into the hands of a pirate broadcaster, who puts the character on air, thus unleashing Max as a semi-autonomous, renegade cultural agent. Carter survives the process, and with Theora manages to expose the blipvert crisis for what it is, catching blipvert creator Lynch and callous network head Grosman in the glare of a television sun-gun as he broadcasts this dénouement live over Network 23.

Max Headroom broaches several critical/dystopian themes. The central conflict anchoring the narrative pits "the network" against "the reporter" in a classic formulation of the lone and righteous hero facing an evil bureaucracy. This conflict of the individual versus the (technologized) corporate institution clearly draws on legacy-era narrative structures. It is updated for the 1980s by its setting in a media empire, piggybacking a critique of technologically-mediated culture to its David and Goliath tale. Network 23 head Grosman is willing to sacrifice the viewers for blipvert money, while his antagonist Edison Carter is a populist figure whose muckraking "What I Want to Know" show is a quest for knowledge rather than profit. Grosman, the literal 'big man' whom the film credits do not even bother to grace with a Christian name, chases ratings to justify advertising costs; his orientation to the television medium is that its purpose is to deliver viewers to advertising clients, rather than content to viewers. The film also incorporates elements specific to the age of personal computing, in the figure of the young, amoral hacker Bryce Lynch who is responsible not only for the fatal blipvert technology, but also the programming that creates Max Headroom. A much more ambivalent and frightening figure than the teenage hacker David Lightman in *WarGames*, Lynch embodies the flip-side to IBM's promotion of youthful computing: rather than indoctrinating him into normative work behaviours, Bryce's computer training and virtuosic programming seem to dehumanize him. The film is aesthetically as well as thematically linked to other critical/dystopian texts: its mise-en-scène replicates the temporal pastiche and bleakness of mood perfected in *Blade Runner*, and manifests as well that film's tendency to 'retrofit' high technologies to make them appear battered and worn, aiming to cut short any wondrous evocation or reception of these machines. Mixing 1940s film noir costume elements with lighting bleak and harsh by turns, and hooking up old typewriter keyboards to video displays, rotary dial phones to video answering machines that capture nothing but telemarketing, *Max Headroom* depicts the workers of the future as tired and harrassed, overworked and underpaid.

The framing narrative pits corporate interests against public ones; the corporation in this case is a television network, nicely allowing the film to attack the excesses of media as well as of capitalism. The upper echelons of Network 23 are depicted in highly unflattering light. Boss Grosman is introduced at the head of a long boardroom table, harshly lit from below, dressed in stark black and white. He bellows at similarly contrast-heavy executives, berating any loss of ratings, and trumpeting the power of blipverts—not only do these compressed ads deliver more product per second, but they also prevent viewers from switching channels. They're a control device. And Network 23 is the only station to run them, making advertiser ZikZak ready to offer the network an exclusive and extremely lucrative contract. The board is meeting, though, to discuss a glitch in the plan: the occasional spontaneous combustion of blipvert viewers. Grosman sees a risk to profits; this is why he cancels Carter's story, trying to keep word of the advertisements' deadly effects from leaking, jeopardizing Network 23's competitive advantage. He doesn't care about the human loss of life, characterising the combustion-prone viewers as undesirable in any case: only "pensioners, the sick, and the unemployed" are slothful enough to permit a fatal electrical energy accumulate in their bodies. And no one cares what happens to them; according to board member Edwards, "they have no spending power." Cheviot is Grosman's main foil, a be-tweeded, bearded, rounded man in brown amidst whip-thin stylish flacks, an apparent intellectual thrown among materialistic yuppie wolves. In any case, the characterization of Grosman and the bulk of Network 23 executives continues the trend to the demonization of upper corporate ranks. The corporation can't be trusted to pursue any motives but those of profit; in this case the effects are even more insidious as they are unanswerable to the check of media enquiry. The media *is* the corporation.

While Cheviot attempts to spur Grosman's conscience, and Carter works to bring the network head to account for his actions, Grosman's youthful and precocious protégé Bryce Lynch tempts the executive to further madness. Lynch is the threatening boy-hacker figure of the film, a computing genius who developed blipverts but denies all responsibility for their effects: explaining the means by which viewer combustion is triggered, Bryce disavows culpability, claiming "it really isn't my problem. My brief was to stop channel switching. I mean, I only invent the bomb—I don't drop it." This comment nicley links the young programmer's social irresponsibility with the issue of nuclear war. Bryce is the monster that *WarGames*' David Lightman fails to be, a completely amoral and selfish technophile whose main concern is that his "research funds must not be stopped." Bryce has neither concern for the blipvert fatalities nor respect for network authorities: he quite openly resents being called upon to explain what he does, or to justify his work. His permanent sneer adopted in response to the perceived idiocy of those to whom he must report is broken only into sharp smiles at getting his own way, or accomplishing a feat of technical prowess. Bryce is personal-computer-era nightmare, a hyper-rational whiz kid more attuned to machines than to people. *Max Headroom: The Picture Book of the Film*, penned by teleplay author Steve Roberts, further establishes Bryce's status as a sort of socially-retarded savant, in the following bit of exposition:

> Brilliant as he was in his world of the computer he had no experience in human relationships. At the age of four, when his quite exceptional talents had been perceived, he had been sealed into Network 23's own school and there, remote from others, had arrived in the confused waters of adolescence without the insulating life jacket of a real childhood. (Roberts, no page)

Challenged by Grosman and the other executives to solve the network crisis about to be precipitated by any news leak of the blipvert problem, Bryce coldly suggests that they simply do not publicize the fatalities, and to kill any reporter who might try to cover the story.

Later, it is Bryce who organizes an attempt on Carter's life, hiring murderous street thugs to chase Carter from Bryce's lab—when Carter seems sure to make his escape, Bryce uses his computer to remotely manipulate an exit ramp, an action that flips Carter's motorcycle through the air to devastating effect: upon 'winning' this game, Bryce cheers. The technical challenge of the blipvert being met and surpassed, and its opposition silenced, the project no longer interests Bryce. He moves on to a new project, a digital parrot that simulates a live parrot in wire frame computer modelling. Bryce attempts computer-generated life, telling Grosman that "this is the future. People represented as data." Further, Bryce considers the body to be disposable, as "the brain is only a binary computer, a series of on-off switches" of the type downloadable into a computer. And so, following the near-fatal motorcycle crash that he has precipitated, Bryce 'downloads' Edison Carter's brain-machine into the computer, so that the computer-generated equivalent can offer the network a more tractable reporter-figure than the original did: this is 'Max Headroom,' a name the simulated Edison Carter picks for himself, a simple repetition of the last visual image registered in the reporter's brain before the accident—a notice on the exit ramp arm indicating the maximum clearance of the barrier. Throughout the film, Bryce Lynch is portrayed as nearly non-human: his amorality is linked both to his youth and precocity, where his genius clearly outstrips his emotional maturity, and also to the nature of this genius. Bryce's amorality and complete pragmatism manifests the cold logic of the machine. The film's villains are twin: as their mutual misdeeds are broadcast over Network 23, Grosman and Lynch retreat together into a corner, holding hands—the postmodern corporation, whose rapacity is now undergirded by hacker expertise.

The film shows strong aesthetic affiliation to other critical/dystopian works, and obviously borrows from both *Blade Runner* and *Neuromancer*. Much of the look of the *Max Headroom* sets bears the stamp of Ridley Scott's designs: an anachronistic art-deco backdrop interspersed with high tech devices all lit in a manner reminiscent of Hollywood noir of the 1940s. The general ambience—what we can make out through the murk and tightly-framed shots—is gritty. As in *Blade Runner*, the wonderful gizmos of the future are already old in the world depicted here, scratched, dirty, duct-taped together. Strong diagonal shafts of ambient light transect frames shot using only this inadequate ambient light to partially illuminate its subject, amid a whirr of distraction: desk fans, jumbles of stacked 'retrofitted' technologies blending high and low tech, old and new tech. Eclectic and striking costume design further complicates the visual field while distinguishing the characters from one another—Theora's film noir trenchcoat recalls Humphrey Bogart and Robert Mitchum, and the smoky elegance of the films of the noir period in Hollywood. Add to the pastiche or pirate broadcaster Blank Reg's working class British punk aesthetic of the 1970s: a lopsided and overgrown bleached Mohawk haircut, ripped jeans, and metal ear cuff mark him as a social outsider, an iconoclast. Hired crook and body scavenger Breughel's leather lace-up pants that leave his backside exposed suggest S/M subcultures and practices (sidekick Mahler blends punk and urban black fashions), while Grosman's black and white power suit, with its monochrome stripes and dots mark him as a powerful social agent, superficial style with deep pockets. Judith Kerman nominates the film's aesthetic as reflecting a postmodern anxiety with the status of the real, with the culture of simulation (199). Noting the disjuncture between the dirty and unkempt diegetic 'real world' compared to the gloss and sheen of the network's shows, Kerman claims that for the depicted culture, it is "as if the virtual world of video and computer simulation were more real and more urgent than reality to those who control the world" (200)—a view supported by repeated shots of homeless persons huddled around blazing televisions while Network 23 executives worry less about exploding viewers than about spooking the corporate sponsors with bad press. Kerman thus muses that "[p]erhaps because virtual experiences are so vivid and yet morally neutral, people in power begin to believe that real-world manipulations are also morally neutral" (201), which might explain Bryce Lynch's utterly amoral conduct, and Grosman's acquiescence in it. Bukatman, aknowledging the derivative nature of some of the film's stylistic tics, nevertheless calls the film "sufficiently innovative," to be worthy of critical attention, particularly in its "carefully developed satirical setting" that sees the culture reduced to television (63).

If the film most explicitly satirizes its native medium of television, it broaches other high technologies as well. The computers depicted in *Max Headroom* are pervasive and various; as in other cyberpunk works, they are distinguished by purpose rather than by nature, as instruments of human will rather than as outright narrative agents, with the exception, of course, of Max himself. Bryce's very powerful research computers, or Theora's much simpler 'control' station for Carter, are seamlessly embedded into the narrative universe they underpin. Network controllers like Gorrister and Theora use terminals at which, on multiple small display units, they can watch video feed from reporters or security cameras, access three dimensional maps of varying scale, track subjects and objects, or simply watch TV. These terminals look like stacked televisions fronted by very old-fashioned typewriter keyboards—the kind with circular keys. Bryce's lab features much larger monitors, hooked to processors, keyboards, cameras, medical equipment, and VCRs. Bryce has a smaller networked terminal hooked up in his bathroom, so he can work in the tub.[12] The proliferation of technologies extends to the construction of the film itself, another obivous layer of mediation that viewers struggle through to make sense of the action: Scott Bukatman identifies four separate technological image sources for the film's depicted action, including Edison Carter's camera footage, security camera feeds, computer-generated imagery and models, and view-phone images (67). We can add to this the broadcasts of Network 23 and the pirate station 'Bigtime Television' which hosts Max's eventual broadcasts.

However cynical or dystopian the original television movie might be, the character and story are ultimately recuperated into the technophilic, consumerist fold: reworked as a weekly one-hour American network television drama, *Max Headroom* the series rewrites both the characters and the relations between them to resolve its founding conflicts, ultimately proposing a compromise whereby the dystopian diegetic near-future leaves room for unambiguously desirable behaviours. Following the airing of the BBC movie, *Max Headroom* was picked up as a dramatic series by the ABC television network. Running for 14 episodes over the 1987 season (TechTV), the series is notable for its breathtaking recuperation of the substance of the satire, and its near total rewriting of the primary relationships among key characters.[13] Bukatman characterizes these rewritings as "distressingly recuperative" and asserts that "[e]pisodes of the … series retreated, both stylistically and thematically, from the excesses of the original" (67), excess being the device by which the society of the postmodern spectacle was satirized in the original BBC telefilm. Bukatman notes that the ills of the television-driven society in the movie are personified in the series by Grossberg (renamed, note)—rather than just the figurehead of a corrupt system, he is marked as an individuated villain, who, ousted from a now-cleansed Network 23, furthers his evil plots from the boardroom of a rival broadcaster. Now Edison Carter's work, based at Network 23, opposes Grossberg's machinations, based at Network 66: reconfigured as individual conflict, the systemic critique offered in the British movie is eviscerated. Thus Bukatman notes that "[s]pectacle and reality, once intertwined in a state of 'reciprocal alienation,' are separated and hierarchically positioned" (68). Max Headroom, too, returns to the corporate fold: no longer the renegade host of pirate Bigtime Television, Max works with Edison Carter and Theora Jones at Network 23, having developed (it seems) a sense of social justice that compels him to aid their quests. Most startlingly of all, perhaps, is the recuperation of the amoral and callous programmer/hacker Bryce Lynch, whose budding conscience and conscription into the forces of good are even more implausible than Max's. In Episode 6, "Security Systems", Lynch even uncovers a new, blipvert-esque plot that Grossberg is hatching at Network 66, and sets Edison Carter on the story (TechTV). Once *Max Headroom* jumped the pond, its social critique was greatly watered down, and its more problematic subjectivities—the simulated Max, the heartless Bryce, the powerful and successful Grossman—recuperated into more comfortable relations with hero Carter.

RoboCop

RoboCop (1987), a deeply cynical film, picks up many of the threads dropped in the commericialization and popularization of *Max Headroom*. The film is critical of the tight links between corporate capitalism, high technology, a bloated military, urban blight, and thoughtless consumerism. We enter the film not only *in medias res*, but also *in media*—in the middle of the action, and the middle of the mediation. *RoboCop* uses the multi-mediated narrative point-of-view pioneered by *Max Headroom*, especially in the opening minutes of the film, but to more sinister sustained effect. The opening sequence of the film begins by zooming in on the harsh metallic film title. The industrial, squared capitals of the word RoboCop dissolve into television static over a sweeping helicopter shot of a modern city at dusk. Suddenly, viewers are watching what is immediately recognizable as a local newscast: cheesy/serious intro music, an emphasis on the personality of the two hosts, grainy video, anchor desk, and superimposed digital graphics are visible markers of the genre. The hosts, one a well-groomed Ken-dollish man and the other his overly-hairsprayed female counterpart, smile throughout the "newscast." If this setup meshes neatly with audience experience of 'real' newscasts, the news here on offer presents a twist: a 'Star Wars' missile defense system is officially launched, with minor glitches; South Africa has purchased a French-made nuclear weapon they plan to use to defend Pretoria from encroaching blacks. The hosts seem even more cavalier than is usual—the female anchor is played by a heavily made-up Leeza Gibbons, whom movie audiences would surely recognize as the host of *Entertainment Tonight*, the long-running entertainment 'news' program of dubious intellectual value. Hers is not a persona one would equate with serious news reporting. In a more Baudrillard-esque moment of simulacra, the male host is also recognizable in extra-diegetic fashion: actor Mario Machado's career prior to the filming of *RoboCop* consisted nearly entirely of playing reporters and news anchors in other Hollywood movies (*IMDB*). The blending of the diegetic and extra-narrative real in this case combine to add an air of surreality to these opening moments of the film: viewers at once identify and disidentify with the film's reality. The conventions of newsreporting are familiar but the news itself shocking—and the hosts we know from 'real life' are unconcerned. Later embedded newscasts inform viewers that Star Wars weapons have misfired and incinerated a large portion of Santa Barbara, and that the American Army and the Mexican government are engaged in armed battles with insurgents. All is reported with cheery smiles. The device of embedded 'newscasts' and 'commercials' is a canny method of exegesis because it disguises its status as such by reconstructing the filmic audience as the diegetic audience: drawing us into the narrative reality, where such 'information programming' would naturally address matters of fact otherwise awkwardly presented through codes of fictional representation, like dialogue, voiceover, or montage, for example.

And then there are the advertisements. As in any newscast, proceedings are interrupted by commercial breaks. Here too viewers are presented with the familiar and then pushed into the absurd. In the first ad, an avuncular, lab-coated doctor kindly exhorts viewers to bring themselves and their loved ones into a for-profit "heart clinic" that offers all the latest in replacement tickers: the "Jarvik athletic heart," which he brandishes at the camera, the "Yamaha," and more. Financing is available—"And remember," he intones in closeup direct address, "We care." A later commercial advertises the "6000 SUX," a massive luxury car in the "American tradition"—it gets "8.7 miles/gallon." The car is the punchline to an ad where a godzilla-figure rampages through city streets, to the terror of inhabitants. Apparently, only American engineering—Detroit's finest—can save us from the Japanese menace. The sheer waste, hyperbole, and excess of the car are gleefully proclaimed in this ad, a sharp critique of American consumerism and the vacuity of commercial culture. The streets of Detroit, viewers see in the film, have far greater and more pressing problems than fantastical rampaging dinosaurs, more urgent needs than for the massive automotive horsepower provided by the status car. A third ad conflates the nuclear family with nuclear conflict, promoting the wholesome fun of shared experience, playing the board game "*Nukem*." In the ad, mother and father, daughter and son, stare each other down as minor global nuclear powers, defending borders and engaging in brinksmanship. The father, finally launches a nuclear strike, which the game—a high-tech, futuristic version of the traditional board game, a dizzyingly anachronistic portrayal blending of family fun with high-tech warfare and simluation—graphically depicts as a holographic nuclear mushroom cloud bursting from the centre of the family table, over the heads of the cheering nuclear assembly. Both banal and horrifying, this ad, too, references the known while presenting the absurd. The tone, cinematography, graphics, are pitch-perfect, a complete reproduction of contemporary television practice.[14] As with cyberpunk's deliberately estranging but easily connoted argot, the newscasts and advertisements embedded in *RoboCop* may spoon-feed viewers with necessary information, the background knowledge essential to make sense of the diegetic real, but they appear instead to address us as diegetic insiders, as denizens of the narrative reality depicted therein. The film also addresses viewers as media-literate, capable of distinguishing newscaster gloss from underlying 'truth,' advertisement from programming, self-consciously estranging video from narratively transparent film footage. Making viewers necessarily aware of the layers of mediation between even the diegetic real and its representation, this device encourages a certain wariness in viewers, a certain cynicism to the truth status of the represented world. How unsettling! This device makes us conscious of media, and congratulates us on this consciousness.

When the initial newscast at the beginning of the film returns from commercials, we learn about Omni Consumer Products, a mega-corporation that is charged with administering the newly privatized Detroit Police, whose new crest blends the civic and corporate logos. However easily the crest can be altered, it is clear that the alliance is an uncomfortable one. Both the corporate and the social-services worlds are next presented, each a cliché referencing different genres of film: the cop or cop-buddy film, and the "yuppie" corporate film as discerned by Palmer ("The Yuppie Texts"). First, the police station. Set in gritty 'old Detroit'—a district about to be razed for the erection of Omni Consumer Products development 'Delta City'—*RoboCop* forges its primary (if ambivalent) identification with the area's beleaguered police precinct. Understaffed and undersupported, officers battle an urban criminal army much better organized than they are: backup seems never to be forthcoming, and even ambulances seem not to hurry to the crime scene. In the downtown precinct, gruff uniformed officers banter with one another amidst the steady clamor of petty criminals and prostitutes, the colourful denizens of the front rooms of police stations from *Barney Miller* to *Hill Street Blues*. Officers form a tight band; we are treated to locker room shots where the assembled officers fall quiet on news of the death of a colleague. There is unrest—talk of a strike permeates the conversation. The news reported the violent deaths of several officers; in the locker room there is talk of too-frequent slayings. As yet another locker is cleared out, the gruff, tough sargent indicates that "as usual," donations will be accepted for the bereaved family. The *mise-en-scène* is predictable and familiar, establishing a recognizable salt-of-the-earth policing, but this familiar space, troublingly, is clearly dysfunctional, under a state of duress that makes the viewer uneasy. Such a representation of a civil service in dire straits only slightly exaggerates the urban crises brought about by two consecutive terms of "Reaganomics," a policy that saw vast and deep cuts to public spending. Policing, it is suggested (and I use the passive voice here deliberately, to capture the connotative means by which this scene conveys its message) no longer functions in Old Detroit.

The corporate headquarters of OCP receive no gentler a treatment. It is depicted as a nest of executive vipers, housed in elegant glass skyscrapers and dressed in expensive grey suits. The office spaces are sleek 1980s postmodern design, all glass, black leather, op-art, and wall-to-wall carpeting, with stark white walls leading to high ceilings. There is talk of profit, of personal advancement via intra-corporate politicking, and of union-busting. In the massive boardroom, overstuffed black leather armchairs line an enormous table, placed against the twin backdrops of the receding city sky and a wall of television monitors. The august personage at the head of the table is named by the credits as "The Old Man"—he is the head of OCP, awaiting a demo from the Security Division of the Company, headed by Jones. Here too there is unrest: senior vice-president Dick Jones has a reputation for ruthlessness but Bob Morton is determined to win the CEO's ear despite Jones.[15] OCP, it soon appears, is deliberately cutting corners and sacrificing officers in order to drum up support for their mechanical 'enforcement droids' to replace human policing. Jones intends the latest model, ED-209, to be 'tested' in Old Detroit and then developed for military application. The company head has concerns about delays, cost overruns, and labour troubles. The depiction indexes corporate greed and malfeasance recalling the cynical corporations depicted in *Outland* (1981) or *Alien* (1979) rather than the merit-rewarding spaces of *The Secret of My Suce$s* (1987) or *Working Girl* (1988). The (beleaguered) police are under siege from their own (avaricious) managers. The corporation is the enemy.

In a multimedia presentation making use of the bank of monitors, Jones delivers a rousing speech to the board. He outlines the profits to be gleaned from the exploitation of the untapped social services market. He shows OCP's interventions in the military, hospital, and space exploration sectors. He then introduces his new product, the 'urban pacification' unit ED-209. The unit, preceded by lab-coated technicians weilding a large control console, enters the room to general consternation. All hissing hydraulics and massive robotic might, ED-209 is terrifing and the assembled executives understandably recoil. ED-209 *looks* like a killer robot, consisting of a main unit bearing massive firepower mounted on articulated 'legs.' It whirs and clanks into the boardroom, clearly out of scale, each of its 'legs' taller than a man when raised to full height. Jones chooses junior executive Kinney as a demonstration subject: Kinney is to point a gun at ED-209, to allow the machine to demonstrate a "typical arrest." Kinney points the gun and the quiescent droid roars to its full height, unfolding several integrated guns from its casing, and turning its body toward the 'attacker.' It speaks, in an uncanny modulated male voice: "Please put down your weapon. You have 20 seconds to comply." Kinney quickly and clearly drops the weapon between himself and the "urban pacification unit." But ED-209 responds not by stepping down, but by repeating its demand in a diminished time frame: "You have 15 seconds to comply." Panic ensues, with Kinney making a doomed attempt at flight, while his coworkers struggle to separate themselves from him and the ED-209 relentlessly tracks him. The technicians at the control console vainly rip at wires. As the clock runs down, Kinney is riddled with automatic gunfire, falling to a clearly final repose on the model of the proposed utopian rebuilding of Old Detroit.

Jones's ED-209, clearly a monstrous failure in the eyes of the majority if not Jones himself, is superceded by Morton's proposed RoboCop. Morton, of course, receives a promotion. The two projects are marked as points on a continuum: the project of one power-hungry executive defeating that of another. No great sympathy accrues to either Morton, an arrogant and unpleasant man, or to his project, calling as it does for "poor schumck" 'volunteers.' Viewers are left to wonder what Morton means by this remark—but not for long. Recently transferred police officer Alex Murphy joins the group at the downtown precinct preparing for the day shift.[16] Murphy's first day of this new assignment will be, it soon seems, his last. Called to pursue the getaway vehicle from a bank robbery, Murphy and partner Anne Lewis chase the trigger-happy suspects to an abandoned steel mill. The officers find themselves outnumbered and at an obvious disadvantage. However, they bravely continue the pursuit, despite the delay in the arrival of backup. Soon separated from one another, Lewis and Murphy are attacked by hyena-like bandits, who are gleefully brutal in fighting the officers. Murphy suffers the worst. Surrounded by four or five gun-toting assailants, an equity rainbow of urban racial stereotyping, Murphy is brutalized, tortured, and left for dead in a scene truly harrowing as much for the total callousness of the criminals as for its graphic depiction of the violence the officer suffers. Murphy's hand is shot off: "Give the man a hand!" puns ringleader Boddicker gaily. With a gruesome, final, shot to the head, Murphy falls silent. A tight closeup shot shows the bloody ooze remaining where we might expect a forehead; Murphy stares glazed and prone, unblinking, into the camera. Lewis bursts into tears at the sight of him, disgusted and grieving. He must certainly be dead: the sheer number of times he has been shot, as well as the clearly missing portions of his skull, mark Murphy as a man whose body has been utterly destroyed. The scene is a spectacle of overwhelming harm, of physical mutilation.

The scene cuts to an air ambulance, a hospital roof, a trauma team. A bloody gurney bearing whatever remains of Murphy is raced across the tarmac, down long, antiseptic white hallways, turned abruptly into an operating room. The shots, excepting those showing the long white hospital corridors, are tight, the cuts frequent. Point of view shifts between classic realist distance, to close-framed shots of Murphy from directly above, to what might be Murphy's own point of view, of hovering and babbling medical professionals speaking the technical jargon of emergency medicine—calling for equipment, for drugs, for techniques. Once the gurney stops moving, the pacing becomes even more frenetic, the interventions of the doctors and nurses more urgent. Their work seems, if anything, as violent an intrusion as the original attack: we see Murphy, eyes still opened and glazed, his mouth penetrated by throat tubes, his groin pierced by long needles, his clothes cut from his body, shocks applied to his chest. Murphy bleeds; his body bucks as jolts attempt to shake his heart back to a rhythm. This scene, again, is shot in tight closeup, quick cuts, confusing soundtrack. Again and again we are presented Murphy's shocked, blood-spattered, and mask-like face. Intercut within this cacophony are frames of black, as well as what viewers are left to construe as Murphy's interior reality, his "life flashing before his eyes" at the moment of death. We see repeated depictions, the mechanics of human memory represented as a repeating loop of film: his wife and son, his home, his wife and son, his home. It is truly a terrible thing to watch. Finally, a sustained blackness draws a curtain on this violence and on Murphy's life: bereft of visual information, the doctor's voice calling for time of death is clearly heard, strangely calm, resigned.

The blackout fades to television static; the cinematic black screen reduces to grainy video. The scene is fuzzy, represented in estranging, distorting wide angle. These technical devices, offering viewers a variety of obviously mediated perspectives, paradoxically come to indicate a subjective camera, a first-person viewpoint. A number of subjects peer into this viewpoint, whom viewers recognize as OCP executives. They appear to twist the lens to arrange the focus. One screws down an 'LED' grid just out of the range of perception, at the four concerns of the cinema screen. They speak to themselves about what they are looking at, which appears to viewers to be themselves, as the narrative POV seems to be a limited first person rooted in the visual perspective mimicing the audience's. These scenes, as at the hospital, are disjointed and marked by technical jargon, incomprehensible and estranging. Various cuts seem to indicate the passage of time, but this is unclear. In one episode of consciousness, Morton appears and expresses his disgust that the RoboCop team has seen fit to preserve an organic arm on the prototype. His order to "lose the arm" is callous enough to cause his assistant to recoil, and to suggest that "he"—that is, the 'owner' of the perspective shared by the audience—could hear. Morton is unconcerned, claiming that the "memory banks" would be erased. But the audience remembers. The audience is also forced to juxtapose and compare the three preceding scenes of violence: first the violent orgy that sees Murphy's body destroyed; second, the invasive and violent interventions of the medical trauma to save Murphy's life and then to preserve his body for OCP; and third, the corporation's violent rebuilding of what viewers can only surmise to have been Murphy's body, even if his human subjectivity seems to be absent. The rationalized removing of the still-functional arm is a shocking moment that leaves viewers to question which violence is more outrageous.[17]

When the perspective finally shifts back to conventional realist depiction—cinematography that audiences have learned to read "through" transparently—we see the RoboCop unit marching forcefully if quietly into the precinct of the first scene, preceded by an army of technical handlers. The officers are in awe, chasing after the entourage as kids might chase a circus convoy. RoboCop 'lives' on a sort of 'docking station' when off-duty, hooked into an array of surveillance and monitoring devices that subject him/it to constant scrutiny. His "organic functions" are supported by a paste likened to "baby food." On duty, RoboCop is all angles and rules, harsh efficiency—but he is a very effective officer, rapidly shown preventing three crimes. On the police shooting range, he maintains deadly accuracy and can access greater firepower than the officers who crowd him admiringly. RoboCop is a well-disciplined officer. Lewis, though, notices the idiosyncratic T. J. Laser-styled flourish with which the gun is returned to the holster. Traces of Officer Murphy notwithstanding, RoboCop is violently interpellated into the machine order at several points in the narrative, rendering him an ambivalent narrative agent, at best. First, the submission of his body to the care of OCP via a police release form—the body, signed over in this manner, is subject to the whim of its new owner, whose first clear edict is to "lose the arm." Second, OCP's Morton disciplines officer Lewis for engaging RoboCop in conversation. Learning that Lewis has asked RoboCop his name, reducing the machine to perplexity, Morton explodes: "He doesn't have a name. He has a program. He's *product*."

Tellingly, Morton's rejection of Lewis's behavior explains RoboCop's lack of individual subjectivity, his lack of a 'name,' via recourse to the inexorable linearity of computing: having a program rather than a name means that RoboCop is not a subject, but a goal-directed agent. He is defined by function rather than essence. If Descartes locates subjectivity in thinking, Morton bypasses the thorny metaphysical issues accruing to machine intelligence—or even residual thoughts from Murphy's blasted personality—by recourse to a discourse of function. From this mediating term, the individual identity Lewis wishes to address by name becomes a set of instructions, a use-value, a product. Property, the behaviour of which is constrained by programmed principles as totalizing as were Asimov's Three Rules of Robotics: "serve the public trust," "protect the innocent," and "uphold the law." Later, as RoboCop discovers that the purport of the classified fourth directive that governs his behaviour is to raise OCP above the law he is meant to uphold, Jones taunts the obviously pained and conflicted man/machine in these terms: "What? Did you think you were an ordinary police officer? You're *product*. We can't very well have our product turning against us." Like Morton, Jones emphasizes RoboCop's status as object rather than subject, property rather than person. The paradox the failed arrest of Jones raises in RoboCop's programming—uphold the law, but, do not arrest members of OCP—is enacted in a scene of physical anguish, that leaves RoboCop wincing in pain as he tries to reconcile the conflicting demands on his programming.[18]

Like *Blade Runner* and *Max Headroom*, *RoboCop* ends on a powerfully recuperative note, retreating from the most pressing of its critical readings of corporate and media culture into a reassuring ending at once more abstract and more personal: good (as represented by the police, robotic and otherwise) must triumph over evil (Dick Jones, not simply a rapacious executive, is shown to be in league with the very drug dealers who so mutilate Murphy in the first place: and drugs, recall, are a major bugaboo of the Reagan era). Further, the end of the movie witnesses RoboCop's reascension to subjectivity, and the paternalistic "Old Man" regaining control of a corporation that has been corrupted on a personal, rather than systemic level. Racing to OCP's headquarters to resolve his conflict between arresting and protecting Jones, the paradox of programming his free will cannot override, Murphy/RoboCop engages the ED-209 in a definitive battle that sees the fully mechanized unit decapitated and smoldering: if we must have robots, at least we'll have them anthropomorphic, please. Murphy/RoboCop accesses the OCP boardroom, interrupting a meeting. Presenting his evidence on the bank of monitors where Jones earlier spoke so eloquently, Murphy/RoboCop lets Jones's eloquence hold the board in thrall once more: the monitors replay Jones's confession to RoboCop, linked via the "finger" input into the police officer's visual memory. Jones's crimes are magnified as his image and voice are multiplied across the bank of displays. Murphy can't remember; RoboCop won't forget. Jones, sensing his defeat, makes a last desperate attempt at control and flight, grabbing the Old Man as hostage. Proving his mettle, the Old Man, now privy to RoboCop's conflicting directives, has the presence of mind to loudly fire Jones from OCP. Freed from the constraining, classified "Fourth Directive," Murphy/RoboCop quickly dispatches the former executive. The scene carries overtones of family: as second in command, Jones is the favored corporate son of the Old Man, whose name speaks not only to age but colloquially connotes fatherhood. In the earlier executive washroom showdown with Morton, Jones clearly laid out the order of succession, from the Old Man to himself. After Jones's death, the final moments of the film see a dramatic shift in this order, as the Old Man calmly and approvingly addresses the officer in paternal manner: "Nice shootin' son." This line also recalls the Western film genre, and its conventions of outlaws and enforcers, an idealized American origin narrative. The cyborg is a son and a hero. He replies to the old man: "Murphy," reclaiming his human identity as he strides from the room. Thus are the excesses of technoculture shown to rescue us from the very ills it brings about.

Conclusion

When *RoboCop*'s OCP isn't designing military killing machines in the form of anthropomorphic cyborgs, they are planning to level the detritus of Old Detroit and erect in its place the planned "Delta City" development. It is onto the Delta City scale model that the unfortunate Kinney falls after the ED 209 shoots him. This placement is surely symbolic: Delta City is an impossible, anachronistic dream that neither the film, nor its viewers, can buy into. The development, here appearing in scale model, features architectural stylings reminiscent of the golden age of science fiction illustration, all swooping aerial ring roads, soaring towers, pyramids, and ovoid structures. It is molded in crisp, clean, white, at least until it is draped by Kinney's corpse and covered in blood. Another scene in the film further confounds the utopian longings of the development: a woman is violently attacked by two men in a deserted, dark parking lot, under a brilliantly illuminated, giant billboard for Delta City. The juxtaposition is jarring in its contrasts: between, literally, day and night, the light airiness of the billboard and the glistening squalor of the deserted lot; between the majestic silence of the space depicted and the screeching violence of the night city; and between, finally, the slogan and the reality. The billboard announces

"Delta City: Where The Future Has A Silver Lining," a truly shocking sentiment when considered superimposed over the sexual assault happening at ground level. The Delta City development is the absent heart of the film, structuring all the other events that make up the narrative. "Old" Detroit is the past: it is street crime, overworked police, the urban blight wrought by Reaganomics. Delta City is the future: a corporate development cleansed of historical assocation, like Robert Ventura's Las Vegas so ably used by Fredric Jameson to explicate postmodern architecture. Delta City is idealized futurity; Old Detroit is an ambivalent present.

The utopian longings of Delta City are the flipside to the critical/dystopian presentation of the technocultural near-future. Impossibly at odds with contemporary social realities—Reaganomics, Cold War nuclear paranoia, economic depression, and yuppie materialism—the model city also represents the failures of the historical past to construct this ideal future in the contemporary moment: Delta City resembles nothing so much as the hopeful, naïve, excited evocations of the future produced in the pulp fiction of the early twentieth century, a future that has utterly failed to materialize. William Gibson addresses this subject in a short story, "The Gernsback Continuum," originally published in 1981. The story draws its name from Hugo Gernsback, an early and prolific publisher of pulp science fiction, featuring wild stories of adventure and wildly projective and utopian cover art.[19] In the story, a photographer is assigned the task of shooting art images of the American architectural legacy of Art Deco futurism—"American Streamlined Moderne" or "raygun Gothic" (38)—a style that one character describes as promoting "a kind of alternate America: a 1980 that never happened. An architecture of broken dreams" (41), and which the protagonist asserts "look as though they might generate potent bursts of raw technological enthusiasm" (41). Throwing himself wholeheartedly into the assignment, the photographer finds himself hallucinating a parallel universe in which these populist, flying-car futures, have come to pass: it terrifies him. The appearance of these "semiotic ghosts," as another character names them, can only be put at bay by rigourous immersion in popular culture, as only "really bad media can exorcise your semiotic ghosts" (48).

Salubrious effects of prescribed cheesy pornography notwithstanding, the end of the story sees the never-named protagonist abandon Los Angeles (site of his hallucinations) for New York, armed with "as much as I could find on the petroleum crisis and the nuclear energy hazard," media correctives for a helpless utopianism, a hedonistic futurism (49). And so it is with the critical/dystopian narratives: like the photographer who seeks to "submerge myself in hard evidence of the human near-dystopia we live in," these texts wallow in fear and paranoia to avoid the need to question where precisely the utopian dream went awry (50). Thus it is that in his reading of *Escape from New York,* H. Bruce Franklin specifically invokes this failed utopian impulse, noting that "[t]he wonder city of the future is now society's garbage dump, a pile of rubble and human rot prefiguring worse things to come. The marvellous flying machine is now represented by the smouldering wreck of Air Force One, being looted by New York's raggedy criminals" (30). For Fredric Jameson, modern science fiction's failures reflect "our constitutional inability to imagine Utopia itself, and this, not owing to any individual failure of imagination but as the result of the systemic, cultural, and ideological closure of which we are all in one way or another prisoners" ("Progress" 153). He nicely captures the cynicism and exhaustion of the mode when he writes that "today the past is dead, transformed into a packet of well-worn and thumbed glossy images. As for the future, which may still be alive in some small heroic collectivities on the Earth's surface, it is for us either irrelevant or unthinkable" ("Progress" 152).

Critical/dystopian texts do not, though, finally advocate a rejection of the computer; in the American progress narrative of ever-greater technological freedom, such a future is unthinkable, and well-nigh traitorous to consider. Rather, critical/dystopian texts like *Neuromancer* or *Max Headroom* write seductive, ad-copy visions of a nihilistic near-future that seems at once inevitable and strangely attractive. Delta City and raygun Gothic alike propose systemic solutions rooted in collective action, a rebuilding of society from the ground up: critical/dystopian computing narratives of the 1980s abandon these lofty, unattainable heights to concentrate rather on individual survival in a post-utopian world. Indeed, critical/dystopian texts domesticate and naturalize the computer as much as do the much more obvious integrationist moves of films like *WarGames* or *Ferris Bueller's Day Off*, presenting readers with narratives that allowed them to understand themselves as agential subjects in culture: no matter how intolerable Western society might become, these stories left room for individual survival. Part of the challenge of critical/dystopian narratives is the way the viewer or reader must hit the ground running, as it were, mimicking the fictions' protagonists' quests to function in future dystopias by their own quests to narratively come up to speed, to learn the lingo, to navigate the visuals, to master the scene, decode reality. The dystopian subject is itself mirrored in the harshness of a narrative, a position perhaps replicating the experience of a society trying to adapt itself to a process of widescale computerization at a vulnerable cultural moment.

In *Discipline and Punish*, Foucault writes: "The individual is no doubt the ficticious atom of an 'ideological' representation of society, but he is also a reality fabricated by this specific technology of power that I have called 'discipline.'" Foucault, secure in his lack of doubt, leaves the issue at that—he finds it sufficient to assert that "[d]iscipline 'makes' individuals; it is the specific technique of power that regards individuals both as objects and as instruments of its exercise." Full stop. However, this rhetorical aside, I think, harkens back to the opening insight of "Docile bodies": namely, that man-the-machine is a book written on two registers, the technico-political and the anatomico-metaphysical. Dismissing the anatomico-metaphysical register as a sort of collective false consciousness in which humanity fails to recognize is true (disciplinary) conditions of existence in favor of a fantasy of individuality and subjection to Law, Foucault's subsequent discussion of discipline and the Panopticon really concentrates on the first register. Perhaps this 'fictitious atom' dismissed above is written on this neglected second register, and can be understood to be a creature of cultural narrative, a consequential figure by which subjects undestand their position-in-the-world.. Foucault claims that under monarchial systems of power, it was the upper-most subjects in the chain of power who were the most individualized; under discipline, it is the boundary subjects who are individuated. This cultural shift ought to entail a reconfiguration in the social narrativization that originally heroized but now subjects to discipline those who undergo the process of individuation. That is, if the heroic narratives of individuals operating as subjects of Law reconciled those under monarchial-rule to their system of power, a new kind of narrative ought to reconcile subjects of discipline to their fates. Foucault characterizes this as the shift from a protagonist as memorable man to one as calculable man—or, the narrative model of pre-discipline versus the narrative model of discipline. Foucault means life narrative not in the literary sense, but in the lived sense—literature has continued to write life narratives of memorable man, while experiential reality elaborates life narratives as the subjection to discipline. Thus we have a fundamental tension between literary-social *narrative* and material-social *reality*. The Panoptic model, with its necessary disguise of the extent of its own power, manifests this tension between a lingering social narrative of the memorable man (the individual in the juridical, not the disciplinary, sense) and the underlying structures of discipline with their calculable man.

Critical/dystopian representations of the computer and the subjectivities it invites powerfully address the tensions between the memorable man of narrative and the calculable man of discipline, at a moment of real cultural crisis. Unlike the prison, the personal computer as represented in critical/dystopian texts is a disciplinary object that buys into both the disciplinary realities of segmentation, order, and control as well as the juridical/democratic/parliamentary narratives of individual empowerment and extension of freedom. This may begin to explain the power of the critical/dystopian mode, why it is at one and the same time such a scary and attractive cultural object in these narratives—the narrated machines and subjectivities of this mode are much less easily slotted into negative valuation than a technology such as the mainframe (legacy era) computer, which clearly exerts disciplinary functions on the Average Josephine without giving her much back in the way of feeling like The American Individual. In the legacy era of representation, such a contrast between the system of power (discipline) and the desired narrative of human subjectivity (the individualized, heroized memorable man) is manifest in the epic battles between lone heroic subjects battling wits with the repressive, homogenizing system—in the critical/dystopian text of the personal computing era, it is resolved in the articulation of a new, techno-savvy, cynical, survivalist anti-hero.

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[1] Scott Bukatman writes that the estranging effects of the 'new mimesis' of cyberpunk and avant-garde science fiction deliberately throws readers off-base, presenting a diegetic "world which must be contructed through inference" (12). Bukatman likens this inferred construction to Fredric Jameson's notion of the 'cognitive mapping' via which subjects make sense of lived culture.

[2] According to the Internet Movie Database, no real computerized sequences were shot for the film—wire-model graphics were simply too expensive. The site reports that, instead, black-painted and white-taped scale models were shot, to mock up a simulated wire-frame computer model (http://us.imdb.com/Trivia?0082340). Weird. Someone must alert Jean Baudrillard.

[3] Sammon makes an interesting case for *Blade Runner*'s initial poor showing and its subsequent ascension to popular culture canonicity, a case based, appropriately enough, in new technologies. In *Future Noir*, Sammon argues that *Blade Runner* and the emerging home video market attained a symbiosis, with the film's popularity with home audiences spurring the rental industry, and the rental industry offering in "the perfect environment in which to visit (and revisit)" *Blade Runner* (xvii).

[4] The pastiche is multimedia: not only does the scenography of *Blade Runner* blend architectural, design, and technological styles, periods, and locations, but the film raids other film texts as well: according to the Internet Movie Database and others, footage from *Alien* and *The Shining* is recycled in *Blade Runner*, and several spaceship models appearing in or referring to other films appear as buildings (for example, a *Star Wars* Millenium Falcon and a Dark Star ship from the movie of the same name).

[5] Sammon later details a more explicitly material reason for *Blade Runner*'s pervasiveness on cable and home rental outlets: production and distribution company Warner (now AOL TimeWarner, of course) early became a video market heavyweight, and tested its new strategy of recouping production dollars through secondary release on *Blade Runner* (322-3).

[6] Sammon reports the substance of (mostly negative) audience response cards from an early sneak preview screening. These cards and studio-sponsored audience call-back interviews revealed five main criticisms of the movie (which was granted by all to be visually stunning): the story was confusing; the violence was too graphic; the story at times 'dragged' or got 'boring'; the diegetic universe depicted was "unrelentingly oppressive," and lacking in human feeling; and the ending was too abrupt (Sammon 289).

[7] Working off a $28 million-plus budget, *Blade Runner* needed a bigger opening weekend than $6 million—and, as Sammon notes, this is a paltry take, considering the number of screens on which the film opened. That's an average of about $4,767 per screen, over a 3-day weekend starting Friday, June 25. The per-screen take did not portend full houses (316).

[8] For example, to use Roy Batty again, an early scene depicting Batty at a videophone was cut, and the midshot cutaways to the phone booth were replaced by recycled and reprocessed closeup footage of Batty flexing his graying, dirty fingers. This footage was originally shot for the final scenes of the film, in which Batty is seen to begin to die—at which point the hand cutaways are again used.

[9] And becoming a little more treacly with every passing year. A twentieth anniversary reissue and digital reworking of *E.T.* saw the handguns weilded by government agents transmuted into more family-friendly walkie-talkies.

[10] Most critics also agree, importantly, that his works are not postmodern novels because, although they seem to question humanist notions of the self, ultimately these concerns are narrated away in a conventional realist manner. A postmodern writer like Kathy Acker's *Empire of the Senseless*, by contrast, is built on and out of Gibson's *Neuromancer*, and is a radically unstable text resisting not only closure but also any stable or provisional meaning and characterization, and, as de Zwann notes, it is nowhere near as fun to read.

[11] Delany writes as a science fiction insider, a well-respected author and critic. The disaster and simple idiocy he diagnoses is with respect to genre categories: with the great influx of readers following Gibson's success, 'cyberpunk' becomes a blanket term used to promote any number of books that may or may be part of a pre-existing literary tradition. The idiocy inheres in making cyberpunk mean too much, or conversely, too little, reducing the literary movement to a set of stylistic tics.

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[12] This seems like a reckless electrocution risk! But it does very photogenically place a scrawny, pasty, naked Bryce in harsh, flat, unflattering light from which to orchestrate the attack on Edison Carter. Rust trails down the white tub enclosure add a nice touch of decay to the scene as well.

[13] The TechTV website offers a complete episode-by-episode summary of the series.

[14] While the newcasts and commercials are mounted full-screen, taking up the whole of the diegetic frame, another television show is depicted within the action, on a number of different screens embedded into various scenes and locations, bearning negative connotation. From the glimpses viewers get of the show—in a mom-and-pop convenience store during a robbery, in the window of an appliance shop during a riot, in OCP executive Bob Morton's apartment as he snorts cocaine from the proffered breasts of two party girls—it seems to be some sort of lowbrow comedy/porn production in the Benny Hill vein. A short, greasy, mustachioed, and bespectacled central player named Bixby Snyder is repeatedly shown leering happily at the several young buxom blondes who naively and gladly offer themselves to him. One claims to have brought him another woman as a birthday present; Bixby, wondering aloud, "Can I have you both?" is answered with a thoughtful, "Sure! We've both had our shots." Bixby gleefully and lasciviously addresses the camera and states his oft-repeated tagline: "I'd buy that for a dollar!" Canned laughter ensues. The tagline has catchphrase status—one of the nameless corporate horde at OCP says it to another, with a lewd chuckle. The show is tasteless; it is sexist; its insertions into the narrative, further, associate this type of lowbrow entertainment with moral paucity, with violence, and with the ill treatment of women. Its deliberate, repeated presence in negative, violent, or unsavoury situations offers a critique of media vacuity and the moral decay of many of Old Detroit's citizens.

[15] Jones is clearly actuated by a profit motive, and manifests a callous disregard for human life—later in the film he admonishes upstart executive Bob Morton, "I had a guaranteed military sale with ED209! Renovation program! Spare parts for 25 years! Who cares if it worked or not!" Morton is no great specimen of human feeling, either. Playing corporate power games for access to the executive washroom, Morton angles to have his 'RoboCop' design supplant Jones' seriously malfunctioning ED-209. Unlike the ED-209, RoboCop is built on a human base. Underling Johnson asks Morton when he will be ready to build the prototype; Morton replies, "Soon as some poor schmuck decides to volunteer." But 'decides' is misused here: Morton really means 'as soon as some poor schmuch gets killed.'

[16] Murphy is partnered with veteran officer Anne Lewis. Diminutive and pretty, she nevertheless is shown to be tough and competent, a "good cop" by conventional standard—as Murphy awaits an introduction, Lewis is busy beating a resisting arrestee senseless. In the established tradition of cop buddy films, Murphy and Lewis jockey for the driver's seat of the squad car, share coffee breaks, and work as a team. Murphy tells Lewis about his family, a wife and a son, the latter heroizing his father, and expecting him to do gun-spinning tricks like T.J. Lazer of his favorite television show. These early scenes with Lewis humanize Murphy, showing him to be not simply a driven cop, but a family man, a joker, a friend—a human being.

[17] A smiling, personable man at the film's opening, Murphy indicates to his partner that his transfer was unexpected, but that he is game for the new assignment—later in the film, we learn that Morton has fiddled with police personnel assignments, with the aim of advancing the likely date of 'volunteering,' and thus of prototyping RoboCop. Never explicit, Morton's comment nevertheless adds another layer of conspiracy theory to Murphy's transformation into RoboCop: rather than simply a workaday cop in the wrong place at the wrong time, whose life was essentially over, and could be considered to be 'saved' by the program, this comment leads us to understand Murphy as having been deliberately placed in harm's way. The RoboCop program did not save him, but murder him.

[18] Jones extends the insult to RoboCop's humanity and subjectivity by unleashing OCP's other roboticized enforcement droid product to dispatch RoboCop, characterized as Morton's "mistake." The ED-209 pummels RoboCop, inflicting visible damage to his heretofore invincible body armour. RoboCop, in clear retreat, attempts to shield himself from the hail of gunfire issuing from the ED-209. RoboCop's use of force is purely defensive, facilitating his flight from the scene. He ducks into the fire stairs—ED-209 as a machine has an obvious power and size advantage over RoboCop, but the latter's failing as a machine leaves him certain human strengths, like the ability to descend stairs. RoboCop, one flight below ED-209, pauses to watch as the enforcement droid pauses, adjusts itself in a seemingly nervous hydraulic flurry, and gingerly place a 'foot' on the first stair, promptly falling

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down the flight, helpless and turned over like a turtle, enraged and unable to right itself. Sheer comparison serves once more to humanize RoboCop. Exiting into the OCP underground parking garage, however, he faces a blinding array of police searchlights and the massed firepower of Old Detroit's forces, determined to decommission him. This new hail of bullets further damages RoboCop, who is rescued only by Lewis' interventions.

[19] Gernsback inaugurated his *Amazing Stories* magazine in 1926: the periodical published futuristic fictions. The 'Hugo' is now a major literary award for science fiction; Gibson's *Neuromancer* won the Hugo in 1985.

"Why 1984 Won't Be Like … *1984*"

The third mode of representation is fantastic/utopian. If the integrationist text depicts personal computers instrumentally, as tools via which individual agency can transparently be extended, and the critical/dystopian text employs high technology as a new aesthetic and narrative environment, the fantastic/utopian text nominates the computer as an outright narrative agent. Representations of personal computing falling under this rubric evince a strong optimism about and a promotion of the computerization of culture. The fantastic/utopian text places personal computing technologies at the centre of its narrative: holding up the computer as the solution to existing cultural problems, or as a model technology leading toward a different and better future, the fantastic/utopian text is explicitly *about* computers. Bolter and Grusin's twin notions of immediacy and hypermediacy are useful here: if the integrationist text exhibits a tendency to embed the personal computer in the known, adhering to a logic of immediacy demanding that the technology erase its own visibility as such, the fantastic/utopian text operates according to the logic of hypermediacy, a corollary impulse that spectacularizes the medium (23-4, 31-2). Bolter and Grusin describe "the fascination with media or mediation" as the "historical counterpart to the desire for transparent immediacy" (34). Like the critical/dystopian text, then, the fantastic/utopian work makes an overt spectacle of technology, for the purpose of what Bolter and Grusin call "the enjoyment of the opacity of media themselves" (21): in its optimistic and positive assessments of these technologies, though, the fantastic/utopian text replicates the integrationist position.

The fundamental optimism of fantastic/utopian mode of representation takes many forms: it is manifest in the fantastic portrayals of wondrous machines like the videogame *cum* starfighter entrance exam in *The Last Starfighter* (1984), as well as in the visually stunning and imaginative cinematic depiction of the computer's interior spaces in *Tron* (1982). In non-fiction texts, the fantastic/utopian impulse promotes a vision of personal computing based not only on an ideal of individual personal empowerment, but also on a proposition to transform culture in a much broader way. The laudatory accounts of the computer's 'elegant' binary structure, as described in J.

David Bolter's *Turing's Man* (1984), and the possibilities it offers for instantiating that ill-fated dream of the eighteenth century, a universal symbolic logic, is exemplary of this trend. Fantastic/utopian tropes are manifest in certain machines as well: the Macintosh computer, released in early 1984, is a consumer computing object both aided and hindered by some of its more fantastical elements and utopian impulses, particularly the Mac 'religion' the machine early gave rise to among its developers as well as its users. Advertising for this machine offers another fantastic/utopian text: despite its critical/dystopian trappings, the Ridley Scott "1984" Superbowl ad offers a vision of personal computing that promises salvation from the various enslavements of postmodern technoculture. The 'computer' that emerges from all these narratives is neither purely instrumental and transparent, as in the integrationist version of events, nor part of an all-encompassing system entailing the subservience of humanity to its machinic, cold logic, as in the critical/dystopian vision. The fantastic utopian text places its faith in machinery.

As the title of this chapter, drawn from the Ridley Scott Macintosh ad, suggests, however much fantastic/utopian texts look to an imagined perfect future, they nevertheless draw on the materials of the past, working through this legacy. In this way, fantastic/utopian texts often evince a longing nostalgia, hearkening back to the exhilarating futurism of the earlier part of the century: fantastic/utopian futurism is thus nostalgic in nature, paradoxically conservative in its seemingly wild projections for the future. In "Nostalgia for the Present," accordingly, Fredric Jameson identifies this nostalgia as corrollary to cyberpunk's nihilism. Reading Philip K. Dick's novels, Jameson discerns "a collective wish fulfillment and the expression of a deep unconscious yearning for a simpler and more human social system, a small-town Utopia very much in the North American frontier tradition" ("Nostalgia" 521). This nostalgia is not for any particular historical moment, necessarily, but rather for a time in which history had a meaning. A similar nostalgic desire manifests itself in texts of the fantastic/utopian disposition like *Short Circuit* (1986), a film that begins by evoking a *Terminator*-esque military dystopia only to unmask this reality as a simulation—the true diegetic real of this film sees a sentient and childlike robot bridge the gap between hippie idealism and computer-age pragmatism in the successful pairing of 'his' two main tenders. *The Last Starfighter* (1984) is nostalgic in a different way: set in what one critic names as a ubiquitous and impossible "Frankcapraville, Sleepystate, U.S.A." (Dennis Wood 53), the tale features a meritorious but poor young hero, with his faithful dog, girlfriend, and family all wishing him his piece of the American Dream. He accesses this dream via virtuoso performance on a video game. In both films, the simpler past—60s-era idealism, 50s-era social stability and prosperity, and the timeless and idealized small-town community—is accessed anachronistically through the use of computing technologies.

All the texts falling under the rubric fantastic/utopian are eagerly optimistic about new computing technologies, sometimes achingly so, and more or less overtly pin grand hopes for social progress on the machine. Fifteen years after *Turing's Man*, Bolter and *Remediation* co-author Richard Grusin nicely capture the essence of the fantastic/utopian position. Bolter and Grusin write:

> That digital media can reform and even save society reminds us of the promise that has been made for technologies throughout much of the twentieth century: it is a peculiarly, if not exclusively, American promise. American culture seems to believe in technology in a way that European culture, for example, does not .... In America ... collective (and perhaps even personal) salvation has been thought to come through technology rather than through political or even religious action. (61)

The now-canonical story of the 'triumph' of the personal computer over industrial modes of computing can be considered as a fantastic/utopian tale writ large, a technological David v. Goliath story. Also, the so-called Macintosh 'religion' is resolutely (some say fanatically) fantastic/utopian in tone and scope: as the title of a later text like Levy's 1994 *Insanely Great: The Life and Times of Macintosh, the Computer That Changed Everything* hints, Mac developers and *devotés* see their favored technology as a world-changer rather than a glorified toaster-equivalent, as the integrationist narrative might suggest.[1] Embedded within this story of the development of the personal computer are early popular codings of the 'hacker', another utopian figure: Steven Levy's 1984 text, *Hackers: Heroes of the Computer Revolution*, most notably, outlines three generations of heroic, liberatory battles between techno-Davids and sluggish corporate, military, and academic Goliaths. In a similar vein, more academic treatises, imploring intellectuals of all stripes to join the revolution, but particularly those in the humanist disciplines, begin to appear in the 1980s. Notable among these are Richard Lanham's *The Electronic Word: Democracy, Technology, and the Arts* (1993; reprints and expands earlier material) and Pamela McCorduck's *The Universal Machine: Confessions of a Technological Optimist* (1985). Both texts propose revolutions in humanistic enquiry or daily life (or both) resulting from the whole-hearted adoption of computing technologies, practices, and mindsets in humane culture.

The fantastic/utopian position is the one which most handily allows technology to function as the *deus ex machina* of our imperfect culture.[2] There is, however, variation within this category. Texts range along the spectrum between more purely fantastic and more explicitly utopian, with particular generic tropes accruing to each pole. Fantastic texts are more likely to anthropomorphize the computer, as in *Short Circuit* and *Tron*, or to bridge massive plausibility gaps via wondrous evocations of computing, as *The Wizard* (1989) and *The Last Starfighter*. *Superman III* (1983) offers the fantastic computing text *par excellence*, with unlikely sub-villain turned sidekick Gus Gorman (Richard Pryor) and his personal computer operating as a foil to the increasingly cartoonish Man of Steel, mixing two great American icons—the technological and the narrative, in a salvation narrative to embody Bolter and Grusin's reading of American culture—to idealize a new computer age that will not only solve the woes of rampant (racialized) unemployment and social stagnation, but also allow fantastic new opportunities for Superman to save the day. The technologies in these texts make little attempt at realism or plausibility—the computing machines are more magical, evocative objects in the sense that Sherry Turkle develops, the "wondrous machines" that H. Bruce Franklin discerns in the wildly optimistic 1930s and 40s science fiction pulps (Turkle *Second Self*; Franklin). Utopian texts, somewhat differently, hang an explicit world-changing agenda on the machine. The computers appearing in these texts are far more believable, indeed often actual: it is rather the depicted computer-enabled cultures they undergird and support that depart from the real. A series of Apple ads anachronistically depicting popular revolutionary figures from American history using their machines is emblematic of this type of representation. The Apple Macintosh computer, as well, embodies utopian impulses: the machine's design, we will see, is highly didactic, explicitly aiming to promote particular kinds of computing at the expense of others, explicitly populist and anti-legacy system in its ambitions. Some of the utopias on offer are more or less revolutionary with respect to the standard narrative of progress promoted by integrationist texts: at one extreme, for example, Levy's hackers work towards communitarian goals against the operations of the private-property-based free market, while McCorduck's technological optimism would have everyone learn how to program their VCRs in continuation of the quest for the dominance of the will of the individual over the constraints of the social.[3]

As we might expect from the texts examined in the other two categories, many fantastic/utopian texts range across the spectrum of possible representation. The Macintosh "1984" ad, for example, fantastically nominates the underpowered Macintosh as a tool with which to wrench humanity free from despotic (technological) tyranny, manifesting a utopian impulse the machine embodies in a carefully engineered package designed to appeal to non-traditional computing subjects. Similarly, it is fantastic in its evocation of Orwell's novel, while it is utopian in its design of a radically new interface for new real-world constituencies. Tracy Kidder's mass-market industry biography *The Soul of A New Machine* (1981) also straddles the boundary between fantastic and utopian, as it follows and narrates the progress of a computer company at the cusp between the prior ethic of big machines and the new world of personal computing. *Visicalc*, too, the 'killer app' that boosted early sales of the Apple II, is at once a fantastic and a utopian technology: the first truly mass-market spreadsheet program, *Visicalc* participated in the reconfiguration of the computer from clerical data entry machine to executive modelling tool.[4] The program allowed users to 'play' with numbers in a previously impossible way. It was a tool that provided its users with the power of projection, a near magical capacity to model or simulate complicated economic scenarios. Visicalc fantastically opened the world of corporate numeracy to modelling—to imagination. It is also utopian in that it supports the early personal computer's claims to extend personal agency and personal control over the materials of bureaucracy; in its pragmatic utiliy, too, it greatly enhanced the value of the Apple II on which it ran, increasing the sales and penetration of that machine.

Fantastic: Wondrous Machines, Brave New Heroes

The Hollywood mass-market film is particularly suited to fantastic representations of personal computing machines, practices, and subjectivities. These films are escapist, family-friendly, and nominally topical as well. At base, fantastic Hollywood texts blend a technological excess with deeply conservative narratives ultimately replicating the values of the more subdued integrationist texts: they prize the triumph of entrepreneurship in the free market, promote the close-knit nuclear patriarchal family, and model the mitigation of cultural extremes in heterosexual union. There is certainly nothing overtly fantastic in these stories, however much such social constructions may indeed be fantasies rather than realities in the most literal sense—these films are largely formulaic and genre-bound, abandonning inventiveness of characterization and story to rely on brilliant visual displays likely to be successful at the box office. As Bukatman notes, "[t]he mode of production of the science fiction film has committed it to certain kinds of narratives, conflicts, and closures that must find a profitable commercial niche" (12). The explicit fantasy of these texts is technological, focussing on the machine. The excitement of these films is generated largely by spectacular displays: in full-screen depictions of computerized worlds, supported by expensive computer-generated images (CGI); in computer-age digital heroism by virtuosic subjects, and, in more subdued form, in startling socioeconomic gains accruing to computer- and gaming 'wizards'; and in anthropomorphized displays of benevolent artifical intelligence, once more allowing the filmmaker's technical art center stage.

Tron, *Superman III*, *The Last Starfighter*, and to a lesser extent and by different means, *Short Circuit* and *The Wizard* offer technological fantasies, displays of (formal) virtuosity and wonder, based in the spectacle. Again, these brilliant technological displays of newness and wonder disguise the conservatism of the underlying narrative, in a relation that Bukatman has neatly summarized: "[i]n the society of the spectacle, all images are advertisements for the status quo" (37). In addition to depicting technological spectacle, fantastic filmic texts *remediate* computing technologies; that is, they work through new computer developments as much as they narrate them. Bolter and Grusin suggest that "in most cases," the use of computer-generated effects have "the goal … to make these electronic interventions transparent" (48). Depictions of new technologies allow filmmakers to push the technological envelope of their craft: depicting cutting-edge machines requires cutting edge filmmaking, from a technical if not a narrative point of view. However, the computerized effects of hypermediated fantastic/utopian texts are often self-consciously marked as such. Bukatman thus asserts the significance of special effects to the film's narrative work as well as its formal structure, noting that "the special effect is often a product of the very technologies that the narrative attempts to explain and ground" (14). Films draw narrative arcs, design aesthetics, and technique from new computing machines.

TRON

According to videogame researcher Steven Poole, Disney's *Tron* (1982) is "the first film actively to engage in an aesthetic dialogue with videogames" (71-2). This aesthetic dialogue takes place in film technique, in set design, in costume design, and in narrative, which borrow heavily from the restricted number of neon colours, the stylized action, and the quest narratives of popular home and arcade videogames. By structuring its vision of personal computing according to the logic and aesthetic of the videogame, *Tron* evokes a joyful, brilliant modern technological landscape, narrated as a space of adventure. *Tron* offers a more fantastic vision of computing for the 1980s than do the integrationist texts, and a much more positive one than the critical/dystopian treatments; aesthetically imaginative, technically innovative, formally coherent, publicly hyped, and narratively topical, *Tron* is a spectacular evocation of a new personal computer age. The fantasy centres on three poles. First, by depicting "a world inside the computer," as the advertising text describes the film, *Tron* promises to show moviegoers "a startling new world where energy lives and breathes … where man has never been. Never before now."[5] Second, *Tron* draws a link between videogaming and computing that conflates game wizardry with real-world computing prowess. Both skill sets are lionized by the film: talented gamers are obviously cool and attract crowds of admirers to support their Peter Pan lifestyles; for their part, talented computer programmers are rewarded with the big corporate prize, an executive office with a view and a helicopter commute. The third fantasy proposed by the film is related to this last: it consists of a new construction of the hacker not only as opposing the excesses of corporate or institutional computing, but also as embodying a new entrepreneurial ethic, contradistinguished against a prior hippie-hacker representation. These three fantasies are new to the 1980s, and are narratively inaugurated with *Tron*—its claims to novelty are not without foundation. Nevertheless, the film incorporates and remediates material from the legacy system as well, notably in a focus on corporate rapacity and malfeasance and on the construction of a malevolent central computer as an agential artificial intelligence.

Four pre-release trailers for the film demonstrate a shift from an early promotional strategy that depends on these negative legacy associations, to one much more fantastic in tone, a shift from an emphasis on scary mainframe artificial intelligence to a wondrous evocation of the computer's interior reality. The earliest trailer devotes a full 30 seconds of its two-and-a-half minute running time to a slow dolly shot that approaches an impassive, shadowed 'ENCOM 511' computer down the length of a polished black hallway. As the camera approaches the machine, a deep male voiceover intones: "The computer, an extension of the human intellect. The ENCOM 511, centre of the most calculating intelligence on Earth, programmed by Master Control to survive. By all means. Soon, the ultimate tool will become the ultimate enemy."[6] The ENCOM 511, the trailer suggests, is HAL 9000 and Colossus wrapped into one—note the rhetorical slippage in the voiceover, whereby inert "tool" becomes an agential "enemy," an unquestioned transformation imbuing a useful machine with malevolent intent. This introduction sets a critical/dystopian tone perpetuated by a fade to the nighttime, red-neon-lit exterior of a brick building marked as 'Flynn's' and topped by a billboard advertising the videogame *Space Paranoids*. A subsequent interior shot shows two men arguing about breaking into the computer, the scene washed in the red neon of the sign. The rest of this trailer shows one of the men, "Kevin Flynn, computer genius, taken prisoner and held captive inside the digital world of the computer itself," amidst racing light cycles and other wonders of CGI before a final sequence which sees an extreme long shot of the computer's interior landscape dissolve into a shot of a city night sky, which then re-dissolves into a pattern of light from the interior of the computer's logic boards that spell out the movie's title. In the language of cinema, dissolves—an editing technique in which two images cross-fade—show equivalence between juxtaposed shots (Hayward 71-2). Here, the deterministic operations of computer circuits visually subsumes the urban geography. The trailer resembles nothing more than the bleak noir stylings of proto-cyberpunk *Blade Runner*, all chiaroscuro and ominous music mixed in with legacy era paranoia about AI, with some more fantastic footage occupying the mid-point.[7]

The next trailer for the film shifts from this depiction of the 'ultimate enemy,' embodied in the anthropomorphized supercomputer, to the evocation of "an unknown civilization" to be explored by human agents: if Kevin Flynn was "taken prisoner" before, now he is "propelled" into the computer's interior, here named a "game grid." If Flynn is "trapped inside an arena where love and escape do not compute," this fact is presented as fodder for adventure rather than terror. He thus enters "a startling new world" where his "journey begins across an electronic sea, on cycles … made of light." The narrator can barely contain his wonder. The CGI is moved to the forefront of this trailer, with a new five-second sequence of narratively moot sheer technical virtuosity, a full-screen digital kaleidoscope attending Flynn's digitization. The soundtrack to this trailer has changed significantly: the first recalled the action and thriller genres, throbbing and urgent, fundamentally tense, and in a minor key. The second is accompanied by a much jauntier score. The first seems targeted to adult audiences, the second to juvenile, a significant change in marketing tactics. The overall structure of the trailers remains much the same after the alterations between the first and second release—early establishing shots of the 'real world' give way to the wondrous, adventure-filled "civilization" inside the computer. None of these trailers give any sense of the film's actual story, as indeed the story is ancillary to the sheer wonder of the diegetic real.

Tron tells the story of a criminal executive, Ed Dillinger, who is using the corporate mainframe for personal advancement: the Master Control Program of the trailer is his invention, a pet project deployed to control the ENCOM 511 to Dillinger's benefit. The film is named for computer program 'Tron,' the object of the quest narrative that structures the film's action. This program would be able to discern the extent of Dillinger's misdeeds, and has been made to 'disappear' within the computer system. An obedient and simple program, Tron is not the true hero of the piece, despite its capacity to catch Dillinger in misdeeds. It is instead hacker Flynn, a videogame designer and arcade champion, who is the film's hero. Tron's programmer, Alan Bradley, finds that his progam has disappeared into the MCP, and no longer responds to his commands. Unable to circumvent ENCOM's security measures restricting their access to the computer—and hence to Tron—Alan and his girlfriend and fellow ENCOM employee Lora seek out Flynn, a former colleague. The film establishes the derring-do and importance of renegade Flynn by showing him surrounded by accolytes at *Space Paranoids*, a game he has not only conquered but also designed. We meet him, Walkman headphones casually draped around his T-shirted neck, as he is engaged in beating the machine's high scores to great applause. A new kind of hero for a new decade, indeed. Flynn soon parlays his gaming skills into a 'real life' foray into computer circuitry: attempting to hack into the MCP from Lora's ENCOM lab, Flynn is digitized by a prototype laser and inserted into the computer's interior. This space physically resembles the visual space of the arcade game; accordingly, Flynn maneuvers his way within it as a prodigy, relying on the same hand-eye coordination and innovative problem-solving that have served him well as a gamer—and as a programmer. Flynn's real-world hack and his adventures inside the circuitry ultimately reveal Dillinger's corruption.

The action in *Tron* takes place in two parallel worlds—the 'real world' as we tend to know it, and the anthropomorphized space inside the computer, where most of the action is played out. The imaginative universe of the computer's interior—where commands *go* when you type them, or where programs *do* their work, the space of computer agency—is a heavily stylized, but nevertheless recognizably human-scaled environment in which various aspects of hardware and software 'come to life' in quite literal fashion, individuated and personified. The trailers suggest that this electronic world is "an unknown civilization … a startling new world where time and distance defy the laws of logic," but it is constructed in deliberate parallel to the real world outside the machine, a world adhering to recognizable social logics and with well-established roles. This parallelism is accomplished in part by creating an interior technological landscape in which individual programs are personified and played by the same actors who portray the programs' creators, while the figurehead of the evil corporation in the 'real world' is the digitized and distorted figurehead of the computer network that seeks to quash these small individual programs. Thus Dillinger doubles the MCP, Alan doubles Tron, and Lora doubles the earnest worker program Yori. Even iconoclast hero Flynn is doubled, if but briefly: the ill-fated CLU—a detective program which refuses to submit to MCP's authority—does not long survive, however. The frisbee-like Bit, diminutively named for the smallest unit of information held by a computer, plays a sidekick role to make up for Flynn's absent double.

Tron's anthropocentrism is a device which allows facets of computer technology to operate metaphorically. If programs are like people, of course they can do things. If a computer is like society, it provides the cultural and geographical context where such programs operate and interact. In much the same way that dinosaurs with dishrags toil inside stone 'dishwashers' on *The Flintstones*, in the information age represented by *Tron*, we are meant to understand the computer's unknowable interior as peopled with little servile agents whose activities are modeled on known human behaviours and relationships. Such a device helps to make the invisible comprehensible, a very useful effect indeed. The 'invisibility' of the processes of computing, especially microcomputing, is one of the characteristics that sets computers fundamentally apart from technologies like the steam engine or the automobile: as a technology of reproduction rather than production (Jameson "Cultural Logic"), a modelling tool rather than an exerter of power outright, the computer risks being unseen as thing-in-itself, unknown as object. This unknowability causes anxiety, as the computer is at once 'Machine of the Year' and a black box: Bukatman suggests that the "invisibility [of computing processes] makes them less susceptible to representation and thus comprehension at the same time as the technological contours of existence become more difficult to ignore" (2). That is, because we do not see the computational processes that result from an activity like keying in commands, it is a matter of faith to imagine the links between input and output: how does the computer do things, then, is at once the most simple and the most difficult of questions. *Tron* answers by devising a fantastic interior universe bedecked in futuristic trappings but adhering to known narrative and social conventions, not least of which is the heroization of an individual human agent.

This heroization of the necessarily idiosyncratic human has as its counterweight the tractable and obedient character of programs, which, while anthropormorphized and set within a magical digital landscape, are utter conformists lacking the imagination and nerve necessary to overthrow the tyrannical MCP. With the exception of MCP, the programs inside the machine straightforwardly transmit their programmers'/users' agency into the digital realm. In Edwards's estimation, the programs are "a servant class that knows its place" (332). The internal dreamscape is a utopian one in which a new kind of hero, a computer hacker and game afficionado, wields great power and uses it to defeat great (if stereotypical) evil. Once inserted into the landscape of the computer's interior, Flynn quickly proves himself an incredibly powerful social agent: he locates and rescues the hapless Tron, and proceeds to do battle with the evil MCP and his personality-free digital goons. According to Tron's shocked testimony, at least, Flynn casts a special kind of spell even in the magical realm of the computer's innards, performing feats previously unimagined and thought impossible: Tron repeatedly gasps, "But you can't *do* that!" and, "That's impossible!" Beyond his prodigious technical talent, Flynn also manifests a uniquely human will and drive: he has more spunk than the programs he befriends, and it is this that makes him special.

The legacy material is hereby refashioned to allow for personal kinds of computing, while still referencing and denouncing the monolithic artificial intelligences so terrifying through the 1960s and 1970s. If MCP comprises a recognizable and generic computer malevolence—like the world-controlling computer of *Logan's Run*, for example—the means by which it is defeated are at once different and more reasonable. Logan defeats the supercomputer through the exertion of manly, brawny, neck-muscle-straining will. In the information age of the 1980s, Flynn defeats the MCP by outsmarting it on its own turf. This is personal computing that emphasizes both of the keywords of the term: the computer is not destroyed in favour of an anachronistic agrarian utopian—rather, one outmoded kind of computing is superseded by a different kind of computing. Thus, domineering artificial intelligences can now be hacked by rebellious young men—but these rebellious young men are aided in their quest by new, smaller-scale computing tools, here personified as servile and friendly computer programs. Monolithic computing finds itself unequal to the challenges posed by idiosyncratic, that is to say, personal, use of the machine. Glass claims that "[b]y the film's end the dominant image is one of a computer anxiety grown to global proportions. As in the paranoid's dream, the external world has become transformed in terms of the internal dreamscape" (20). But I disagree. Glass, perceiving what he feels is a disguised technological determinism, misses the point: the combating of computer with personal computer is meant as a reinsertion of the human on a level playing field with threatening technology. Accordingly, the tagline for the film emphasizes wonder and discovery, not fear or dread: "A world inside the computer where man has never been. Never before now." Flynn's virtuosity inside the 'game grid' astonishes the progams, who continuously exclaim that he accomplishes the impossible. The programs are further amazed to discover that Flynn is not, in fact, a program like themselves, but rather a 'user,' a god-like being from outside the machine that MCP is working to convince the programs is nothing but a religious superstition. A sort of computer messianism is manifest, where anthropomorphized computer programs are as naïve about the operations of the world of the users as many theatregoers would be about the operations of the computer. The balance of power remains firmly weighted in favour of human knowledge though: not only does *Tron* reveal to viewers the heretofore "unknown civiliation inside the machine" but shows that hero Flynn is a master of the digital as well as corporeal universe.

Legacy concerns do continue to influence the movie as well as the promotional materials for *Tron*. In a gesture towards computing films of the previous decade, Dillinger is revealed to be a pawn to MCP, which has inevitably developed a will of its own and turns on its erstwhile master: attempting to maintain his control, Dillinger reminds the MCP that "I wrote you!" but the machine responds that it has "gotten 2415 times smarter since then" and that it will answer to no user. According to Glass, MCP's transformation from tool to agent is stereotypical, an accepted and known narrative gambit, "representing a precise measure of popular fears: the MCP's evil intent is implicit, almost more like a birth defect than character flaw. Exposition would be redundant" (17). For Glass, Dillinger's machinations pale in comparison to the pure malevolence of MCP; human agents must bear signs of humanity, while a mechanical villain "freed from the banal conventional naturalism besetting human beings, this character instead lives through the signs of power" (18). But *Tron* is not a film about evil computers, and this narrative dressing in corporate malfeasance is merely *pro forma*. Rather than critiquing monopoly or transnational capitalism, as did some of the films of the 1970s, Dillinger's criminality challenges Flynn to overtake him, and indeed, by the end of the film, it is Flynn who wears the executive's suit and arrives to work in a helicopter. No paranoiac's dream, then, *Tron* is rather a celebration of new kinds of computers, and new kinds of computing by new kinds of experts, in radically new environments. Edwards suggests that "the film's plot is less important … than its remarkable visual metaphor" (331). But what is important about this negligle plot is the set of values it takes for granted—the value of individualism, the rewards of entrepreneurship, the spoils of technophilia. The computers in *Tron* are firmly domesticated: the vast majority of programs that Flynn encounters can be faulted for their passivity more than for their world-conquering zeal.

Assessing the quality of the debate about computing in the film, critic Judith Kerman claims that *Tron* enacts more of a battle between melodrama and cartoon than between the real and the virtual (196). Certainly, this film is best described as that particular kind of fantasy that the Disney company is so skilled at producing: there are clear-cut villains and heroes operating in a simple moral universe. Glass notes that the film indeed bears narrative kinship to the fantastic quest narratives of Lewis Carroll and Frank L. Baum (17). Glass nevertheless discerns two main ideological currents that underpin the narrative. First, hero Flynn, despite the hacker trappings, the irreverent attitude, the videogaming and the Walkman-wearing, "operates within the moral parameters of old-fashioned, individualist free enterprise" (19).[8] A true individualist, Flynn is the only character in the film whose essence is not doubled, who has no digital dopplegänger. Not subsumed into or duplicated by the machine, Flynn is the most virtuosic of programmers, the most imaginative of computer users, the most skilled of gamers, and the most creative of thinkers. His virtuosity, skill, and creativity are indexed not only by his heroic foray into the computer's circuitry, but also by his ultimate ascension to corporate glory: not just a game wizard or a skilled hacker, Flynn invents saleable product, the highly lucrative *Space Paranoids* game on which Dillinger has falsely built his own career. Alan Bradley and Dillinger offer foils for Flynn: by the end of the film it is neither ambitious and canny Dillinger nor earnest and honest Alan who ascends to the corporate heights, but Flynn, his rebellion rewarded with the executive position vacated by Dillinger. Paul Edwards suggests that *Tron* "romanticized computer hackers and video gamesters as antiauthoritarian cowboy heroes" (331), but it is important to note that at the film's end, Flynn abandons the arcade for the boardroom, a particularly 1980s cinematic marker of success and heroism.[9]

Second, according once more to Glass, in the world of *Tron*, "technology, not social relationships, makes the world go round" (20); this is evidenced by the enacting of the bulk of the movie inside the computer itself, and by the visual equivalence drawn between the interior of the computer and the modern city. Poole distinguishes *Tron* as a "shallow, primary colour fable" that cashes in the popularity of video games in its art direction while promoting a shiny new heroic subjectivity (72). Alan's quest for Tron, a program which goes missing inside the larger network of the company, exemplifies the splitting of 'computer' from 'personal computer' and literalizes the individual's supposed subjection to the first machine and this individual's new agency with respect to the latter. The third and fourth trailers elaborate on the wonder and newness, but aim for more topical associations. The third trailer conflates the world inside the computer with Flynn's computer gaming, segueing between an over-the-shoulder shot of the programmer playing *Space Paranoids* to the scene in which he hacks MCP and is digitized, into the digital realm where "the Master Control Program has chosen you to serve on the game grid." The tagline, narrated over the final title shot, reinforces the link to gaming, telling us that "the *adventure* begins this summer." *Tron* is probably the first movie to link heroism and real-world adventure to game playing. Indeed, it also spawned a successful video game of its own. Remember that 1982 is the height of the arcade videogaming craze.[10] The fourth trailer attempts an overt tie-in to personal computing. The standard establishing shot, dollying in to the ENCOM 511, is truncated, now supplemented by another slow dolly shot on a different scale: an extreme close up along the 'valley' between rows of keys on a computer keyboard, rendered mostly unrecognizable by this shift in scale and by disorientingly tight framing. This shot once more dissolves into another tight closeup, the keyboard from above. This shot pans out and resolves into a recognizable keyboard geography, tricked out with extra, rune-like keys. In this trailer, before he is digitized, Flynn hits a large red key that glows "TRON" when depressed. As we have seen, the personal computing industry exploits the success of videogames as a 'hook' to draw consumers into purchases. The IBM "Dad, can I use the IBM computer tonight" advertisement suggests a link between recreational gaming and more lucrative skills such as programming. The narrative heroization of gaming offers a more fantastical justification for computing that works to the same effect from a different angle. *Tron* literalizes this link in its construction of parallel narrative worlds across which only the gamer/programmer can move with ease.

The Videogame Movie

The newness of gaming, its perceived sorcery over the young makes possible the narrative leap that powers-up, if you will, Alex's dreary existence: writes Wood, "although we largely believe that the environment is sufficiently deterministic of social evolution to fight for its enhancement at all levels, we are delighted to ignore these beliefs at our convenience" (57). The video game, just new enough and bearing enough marks of 'computerishness' to distinguish itself as ultramodern, is the pass-key unlocking the barrier between the mutually exclusive worlds of the class-bound trailer park and meritocratic intergalactic mobility—at least in1984's *Last Starfighter*, the movie about which Wood is writing. *The Last Starfigher* operates in the register of science fiction fable: the fantasy is one of classless meritocratic social structures that reward the talented and the brave despite their initial unpromising material circumstances—a trope that pervades a fantastic/utopian subgenre I call the videogame movie. In these films, the craze for arcade and home videogaming is paired with the hoopla about home and personal computing to fantastic effect. This conflation, which, like *Tron*, equates gaming prowess with saleable computing skill or social value, is exploited by the game and computing markets alike to cross-promote their products, a synergy most baldly evident in 1989's *The Wizard*. This pairing of gaming and computing is necessarily fantastical, borrowing from the narrative excesses of the former to infuse magic into the latter.

In *The Last Starfighther*, Alex Rogan, a teenaged trailer park denizen with videogame skills, finds he's been recruited to actually fly the missions his favorite game has simulated; nothing less than the fate of known and unknown civilizations depends on him. This is a lucky break for Alex: he's just finished high school, and as we find out early in the film, he has been denied a loan to a decent college and is thus staring down the barrel of life as a trailer park manager. In this film, video games literally lift Alex from his mundane existence and refigure him as an intergalactic hero. His material class status is irrelevant in outer space. Denis Wood writes that *The Last Starfighter* is split between the mundane and the fantastical: if those portions of the film set in outer space strike us as implausible, silly, a low-rent *Star Wars*, the Earth locations are two-dimensional in their own way too. The trailer park "is an icon of the ordinary, the everyday. This is anywhere. This is everywhere. This is nowhere. This is Frankcapraville, Sleepystate, U.S.A." (53). The insurmountable distance between these two arenas of action—between Frankcapraville and *Star Wars*—is bridged via the magic of the videogame, a machine left in the trailer park by chance, neglected near the general store, outside on a porch. Alex plays at night, alone. He's a virtuoso, and as his score approaches a record-breaking level, crowds gather and cheer: soon he's a classless outer space hero who gets the girl and lifts off into the intergalactic night with the respect and awe of his erstwhile peers aiding his ascent.[11] It is difficult to determine what's more implausible about this scenario: groups of middle-aged trailer park residents in their pyjamas cheering a videogamer on to a high score, or this high score vaulting the teenager into space combat. Via gaming, Alex overcomes his class, his earthly fate (Wood 61).

The Last Starfighter most clearly demonstrates the fantasy of unlimited upward mobility whereby both discourses—of the trailer park and of intergalactic military conflict—propose a technological fix to material social problems nurtured by computer and gaming companies alike—as with Hollywood, gaming forges a synergy with the 'home computer revolution'. We see this slippage in (relatively) less fantastic form in *National Lampoon's Vacation* (1983): Clark Griswold, preparing for the vacation from hell which is always his fate, interrupts his children's videogaming to use the family computer to demonstrate the planned route. As Clark navigates a blocky green Family Truckster across a digital continental US, son Rusty uses his game joystick to unleash a PacMan in pursuit. Daughter Audrey soon joins in with a *Space Invaders*-styled ship to blast her brother's character, as Clark protests their intrusions. The personal computer (an Apple II) and the game unit are equated: both are console machines that sit on the coffee table and display blocky primary colour graphics through the TV. The "Dad can I …" IBM Personal Computer advertisement also narrates this computer/videogame synergy quite clearly, in its sales pitch to a *paterfamilias* seeking the best for his family:

> Just by playing games or drawing colourful graphics, your son or daughter will discover what makes a computer tick—and what it can do…. Your kids might even get so 'computer smart,' they'll start writing their own programs in BASIC or Pascal. (IBM)

Or saving the universe.

The Wizard, a not-terribly-memorable "Christmas kiddie movie" released in December 1989 by Universal Pictures, once more pitches the magic of videogaming as a solution to otherwise intractable problems, if less fantastically than *The Last Starfighter* (Ebert). Crassly commercial, *The Wizard* cashed in on the fleeting celebrity of pre-teen Fred Savage (of *Wonder Years* fame), and shamelessly shilled for the studio's own Universal Studios Theme Park, setting the climactic chase scene within the park. The movie hangs its central premise, though, on the hook of videogaming. Characters spend vast amounts of time on the phone with a "Nintendo videogame counselor," in an obvious plug for Nintendo's vaunted phone-in tip line. *The Wizard*'s credits acknowledge a "Nintendo advisor" as well as a "Powerglove consultant"—cross-promotion is evident. The movie is no less concerned with promoting Nintendo—the climactic gaming scene introduces *Super Mario Bros 3* to the public, and multiple game screen shots take up the cinema screen over the course of the film—than it is with promoting Universal Studios Theme Park; home, arcade, and competitive gaming are the stars of the film.

Beyond its commercialism, though, the film is notable for once more lowering the age of entry to the computing revolution, and for demonstrating the spread of personal computing and gaming technology across a range of public and private spaces. Titular wizard Jimmy plays in bus stops, diners, full-scale restaurants, and at a children's casino in Reno—these games are the very same as those offered on the console units at the competition, and used in the home. The contestants in the competition are all children; Jimmy's most serious competitor is Lucas, a Power-gloved bully the same age as Jimmy's older brother Corey (Fred Savage). The adults in the film are uniformly inept. Gaming has become, literally, child's play, the stuff of amusement parks, a regression of age through the progression of the decade: *Tron*'s Flynn was younger, scruffier, and cooler than astronauts Poole and Bowman of *2001*; *The Last Starfighter*'s Alex Rogan, like David Lightman in *WarGames* and even Ferris Bueller, is a yet younger gamer/whiz; by decade's end, the thirteen-year-old stars of *The Wizard* operate as protectors to the still-younger game genius whose skill gains national attention. Videogame films, then, as a genre, work to lower the perceived expertise required to participate in the home computer revolution first by likening the computer to a game, and second by decreasing the age of its computing/gaming wizard protagonists over the decade. Pegging the excitement of gaming to the practices of computing, these films also infuse personal computing with and aura of fun and excitement it might not otherwise merit. Finally, by proposing a causal link between game virtuosity and real-world heroism or success, the videogame movie proposes a model of computing that, as Wood notes, allows us to circumvent material constraints on agency—class, expertise, age—we know full well to be otherwise deterministic.

Stranger Bedfellows Still

If the videogame movie offers a fantasy of personal computing by conflating the diegetic heroism of gaming narratives with real-world heroism, ultimately promoting a positive characterization of individualized computing practices and machines, other movies work to mitigate the residual threat of the legacy computer and to resolve the conflicts central to the critical/dystopian narratives by recourse to outright fabulation that uses fantastical visions of computing to elide real and perceived dangers—nuclear holocaust, malevolent artificial intelligences, grey totalitarianism, amoral and omnipotent corporations—of the developing technoculture. Films like *Short Circuit* (1986) and *Superman III* (1983) are sentimental and buffoonish, respectively; the Ridley Scott "1984" Macintosh Superbowl television commercial is overwrought—however, as ridiculous and overblown as each of these texts might be, they soothe the 1980s frazzled soul harassed by ills real and imagined. Superman and the 'Archibald School of Data Processing,' George Orwell and Apple Computers, and a lovable robot and nuclear holocaust may make strange bedfellows, but these narrative pairing effectively resolve—by elision—fears that kept the collective self up at night. The fantastic aspect of *Short Circuit* (1986) inheres in its use of animated machinery to propose a cultural ideal mediating between the extremes of, first, corporate militarism and technophilic nuclear brinksmanship; second, of a bubbleheaded nouveau-hippie mentality that would rather discover a sentient alien than a sentient machine; and third, of a hackeresque technical genius unleavened by social graces or investments. Recalling Tracy and Hepburn's *Desk Set*, *Short Circuit* uses the machine (and machine anxiety) to bring together into heteronormative bliss a 1980s odd couple. The childlike robot 'Number Five,' further, proves itself an adept cultural subject in 'his' own right, manifesting a greater popular culture literacy than the malapropism-prone Ben Jabituya, a Pittsburgh-born, sub-continent accented, Indian sidekick to the movie's heroes. The film ultimately proposes that, by being open to the wonders and the magic of the machine, marginal subjects can be reintegrated into the fabric of society, finding love and assimilating into cultural norms.

Short Circuit, directed by *WarGames*'s Badham, seems at first to offer another Cold War cautionary tale of solidly critical/dystopian pedigree. The opening credit sequence intercuts title-text with the fetishes of an advanced technoculture, shot in tight closeup: computer screen-shots, with monochrome green scientific-y displays; clickety keyboards; and chips, boards, cables being assembled and soldered by gloved hands. The credit information is presented as art-deco-esque titles intercut into this montage, in a styling reminiscent (once more) of Fritz Lang's *Metropolis* (1927). The whole is set to bleepy computer-ish music. From the various mechanical implements—again shown in tight closeup—being meticulously pieced together, viewers can see that a robotic machine is being built. The opening minutes show, in a series of tight closeups and bursts of violence, what appears to be a military conflict successfully and devastatingly waged by robots against a human army.[12] After the machines have completed their spree, a tracking shot follows one robot from the bunker and into the open: this is the first full shot of the robot. It is only vaguely anthropomorphic, having arm-like and head-like appendages; however, it rolls around on what look like tank treads and shoots lasers out of its back. It speaks in a metallic monotone: "Enemy neutralized, ladies and gentlemen. Objective completed." This *mise-en-scène* offers the familiar fetishing-as-alien of computing technology, with an ominous gesture toward monster-creation movies of the 1920s and 1930s. As with *Weird Science*'s 'blinkenlights' montage, this sequence evinces a similar *pro forma* feel, a generic necessity becoming quite well-established and presented in an aesthetic and narrative shorthand before the action proper of the film even commences.

Like *Weird Science*, too, *Short Circuit* turns to comedy: where the teen Frankenstein film deployed the computer off-handedly and instrumentally to set up the narrative's main focus on a magical dream girl, though, in *Short Circuit* the magical central character is itself a machine brought to life. The camera angle shifts, and finally we are offered a wide shot, from behind the robot, the first true master shot of the film.[13] It has been speaking to bleacher-fulls of people, some in suits and many in military uniform. Behind the bleachers, a billboard reads "NOVA Robotics" and "Tomorrow is here." Soon, robots are pouring perfect gin-and-tonics for the company CEO who asserts that "if the question is survival, SAINT is the answer." 'SAINT' may be, as the assembled masses at the demonstration are told, an acronym for 'strategic artificially intelligent nuclear transport' but the salvationary hopes the robot is made to carry are at once clear and ironic. As robotics engineer *cum* robot-loving rebel Newton Crosby (Steve Gutenberg) points out, it is a little ridiculous to propose a new killing machine as the harbinger of world peace. This all looks a little too much like Cameron's *Terminator*, or Verhoeven's *RoboCop*, a setup to corporate technological hubris along the lines once more of the 1970s dystopias. However, this emerging critique of the military, as well as the ambivalence and dis-ease its characterization within the film may cause viewers, steeped both in Cold War nuclear paranoia as well as in the generic conventions of similarly constructed dystopian films, is mitigated by the sudden adoption of a fantastical comedic mode.

And *Short Circuit* is indeed a comedy, a romantic comedy at that, which moves from this bleak presentation of the 'ideal killing machine' to a magical tale of a soul-ful robot that makes friends and changes human lives for the better. As with *Tron*, the tagline for this film emphasizes wonder and magic: "Something wonderful has happened," the posters assert, "Number Five is alive."[14] Intercut with the hob-nobbing scenes, we see robot number five (hereafter 'Number Five' is adopted as its name) get struck by lightning, and begin immediately to malfunction in non-threatening, slapstick ways: given an un-reverent kick in the rear end by technicians, Number Five rolls after robots number one through four headed for the storage area, but fails to negotiate corners, careens off-course, gets hit by a garbage-removal vehicle, is pushed onto a truck, and exits the NOVA compound.[15] It is at this point that *Short Circuit* asserts itself as a fantastic/utopian film. Once Number Five begins to 'malfunction,' the film moves away from a generic identification with the action/thriller/horror movies in the *Terminator* vein and into fantastic comedy. This shift is reinforced by the narrative's sudden change in tone: the invitation-only demonstration and sales meeting organized to unleash SAINT into Cold War military deterrence, so carefully set up in the opening sequence of the film, evaporates and we are left with cartoonish corporate and security heads on a quest to recapture a robot that has fallen into a cowpatch and is being licked by a dog. NOVA security forces—recall that this is a manufacturer of nuclear weapons—are bumbling and cowardly, showing great proclivity for turning tail and running when given the opportunity.[16] The very real threat to world peace proposed in the opening scene simply vanishes once the 'something wonderful' happens to Number Five.

Following Number Five's progress outside the compound, Newton Crosby can access the robot's 'thought-processes,' a jumble of disconnected impressions and visuals: ads for Dr. Pepper read from a highway billboard figure prominently. Crosby, ensconced in a fairly realistic looking robot control room, with the requisite white-coated attendants, watches in puzzlement as the robot's malfunctions ("and what a malfunction!" Crosby exclaims) are reported back.[17] Crosby is the engineer responsible for the technical aspects of the SAINT project, but is shown to be a reluctant participant in military PR: a self-identified science geek, he invents for the sake of invention and discovery. His vaunted rationalism and logical thought processes do not endear him to his corporate and military bosses: when these propose SAINT as a "weapon to keep us safe," Newton quite reasonably (if disingenuously) asks, "what's so safe about blowing people up?" Uncomfortable with an inflated military rhetoric that proposes the robots as the "ultimate soldier," Newton once more demurs: "I had non-military purposes in mind. I designed it as a marital aid." Thus he demonstrates his outsider status with respect to the power structures of the corporation that sells and the military that buys the products of his invention. Newton is a cultural outsider as well, so wrapped up in his arcane and specialized work that he rarely leaves the NOVA compound, telling a coworker at one point that "it's been five years since I've driven" a car. Number Five's escape forces Newton from his comfort zone, sending him on an adventure: forced to leave the comfort of his lab to pursue the errant robot, Newton is also forced to reconsider his assessment of the machine's he's created. Initially, he is quite vehement in his assessment of Number Five's behaviours as a malfunction, refusing to acknowledge the machine's increasingly obvious sentience. Typically, he claims that "It's a machine: it doesn't get pissed off, it doesn't get happy, it doesn't get sad, it doesn't laugh at your jokes.

It just runs programs!" However, he becomes an unwitting protector of the robot as he races against NOVA's recovery team can locate it—NOVA plans to destroy Number Five, while Newton wants to study its malfunctions, each adhering to stereotyped reactions.

While Newton and sidekick Ben search for the missing robot, Number Five gains a human protectress, spacy Stephanie Speck (Ally Sheedy), an animal-loving caterer with a messy house and a lousy boyfriend. The robot has hidden itself in Stephanie's catering truck, but is too guileless to lie low, instead kicking up a comical ruckus as it explores the truck's interior. Expecting to find ex-boyfriend Frank inside the truck, Stephanie reacts with downright glee to find instead what she takes to be an alien dumping out the ceral boxes and squeezing packets of mustard all over the place. Stephanie is made to look the fool here, exclaiming "Oh my God! I knew they'd pick me! I just knew it!" Soon, after making the requisite (comical) diplomatic gestures to outer space's delegate, Stephanie leads her guest into the house, where she gives a fairly dizzy introduction to 'this planet.' Number Five has been demanding 'more input, more input' and is finally satisfied by reading every book in the house and watching TV all night. If the beginning of the film recalls Cameron's *Terminator*, Number Five's encounter with Stephanie cites Steven Spielberg's *Close Encounters of the Third Kind* (1977) and *E.T.: The Extraterrestrial* (1982) in its depiction of friendly wonder and entrenched rural domesticity. Certainly, Stephanie is agog when she thinks she is dealing with an alien; she is angry when she finds out that Number Five is the product of human engineering, going so far as to renounce her budding friendship with the robot by calling NOVA to come pick it up. She surmises that any reward money that might be coming to her would help her feed the stray animals she cares for. It is only the animal-like fear that Number Five evinces on being told he is to be disassembled that convinces her the robot may be alive and thus worthy of her care: this computing machine is less like a HAL 9000, and more like Bambi, a lovable naïf looking for a home. The robot displays a childlike wonder at the trappings of everyday life: cows, dogs, butterflies, televisions, kitchens. Number Five is fiercely loyal to his friends. Number Five can laugh at jokes (the ultimate test of life, according to engineer Crosby) and fear for his own life. Although prone to machinic behaviours like citing dictionaries and encyclopaedias verbatim, an over-literalness at least where recipes are concerned, Number Five displays more human characteristics than many of the human beings in *Short Circuit*.[18]

The robot exerts a moderating influence on those who come to care for it: Stephanie overcomes her kneejerk aversion to machinery and accepts the robot as worthy of care, while Newton's transformation reverses his prejudice for the company of logical machines over perplexing people when he comes to admit the magic of Number Five's illogical sentience. By learning to care for Number Five, Stephanie and Newton learn to care for each other as well, overcoming their initial mutual hostility through the shared experience of the magic of Number Five's sentience. The film's concluding sequence shows them on the road to Montana with Number Five, concocting a plan to live in seclusion *en famille* with their robot 'child.' As in *Desk Set*, then, the computing machine facilitates human love match that sees extreme personalities moderated and contained in heterosexual union. To reprise Andrea Slane's reading of the role of the mediating computer in the earlier film, in *Short Circuit*, the "conflict of rational and irrational thought was staged as a gender conflict" (73): touchy-feely Stephanie versus rule-bound Newton. Unlike the ultimately still-strange EMERAC, though, Number Five is a fantastical and agential child-figure, a key and lasting component of the union between Stephanie and Newton. If Bunny Watson and Richard Sumner are the two-who-become-one through the circumstantial proximity brought about by the introduction of EMERAC to the workplace, Number Five is a central figure in the new-minted nuclear family which has Stephanie and Newton operating as 'his' parents long before they become a couple in their own right: the wondrous machine is integrated here in a way undreamed of in the integrationist advertisement.

Superman, too, engages in a strange pairing—the third installment in the superhero series sees the man of steel paired with an unemployed, black, urban computer hacker and set against his most formidable foe yet: a supercomputer programmed by a the aforementioned petty-crook savant and owned by yet another evil corporate tycoon. The movie stands as an odd mixture of the mythic and the topical. It is primarily fantastic/utopian at base, though, because the more realistic, current, or plausible depictions of computing are used as a launch pad into sheer whimsy and slapstick: integrationist and critical/dystopian tropes are evoked, but ultimately abandoned. *Superman III* blends its two different plot strands together to offer what in the final instance must be read as a fantastic/utopian depiction of computing. Indeed, it blends fantastical as well as utopian elements into its narrative, shifting its focus between the magical superhero adventure story, and a more plausible—if utopian—rags-to-riches story in which an underprivileged human character joins the information age. Fred Glass, the only critic to weigh in on the film, suggests that *Superman III* offers a more incisive critique of the culture of computerization because of its jokiness, that playing the fool, as it were frees it to offer more radical readings of the computer (23). Not so much a battle between an evil computer and Superman, *Superman III* narrates competing visions of computing: the small time, upwardly mobile hacker versus grasping corporate leaders with an eye on monopolistic power, and with nearly unliimited funds to foster technological supremacy. Not incidentally, *Superman III* once more recuperates the hacker figure into social acceptibility.

In the main fantastical plot, Clark Kent's alter ego is set against evildoers armed with computers, who plot to control the world through the launch of a computer-controlled satellite which will control the weather. Having this power at their disposal, it will be easy to hold the world at perpetual ransom. Superman, of course, is the main impediment. Reviewing the ill success of other plots against the man of steel, evil tycoon Ross Webster opts for a more scientific, modern method of defeating his main opponent. In order to dispatch Superman, Webster orders the computer-aided scientific analysis of kryptonite, the mineral well-known to rob the man of steel of his powers; this information is used to synthesize the mineral to use as a weapon against the superhero. When this plot fails (owing to a mistake discussed below), Webster decides to build a 'super-computer' in a bunker in the desert. This machine recalls the legacy computer of the 1970s cinema, an enormous, flashing, laser-spitting purveyor of doom, and symbol of abused power. This narrative arc mitigates the dystopian elements of the corporate-computers-gone-wild theme by opposing them with nothing less iconic and powerful than Superman: it is clear who must be the winner of such a contest. Fought on such epic proportions, the battle of man versus machine is abstracted from the daily reality of the ambivalent computerization of culture; it attains the distance necessary to become a comfortable clash of the titans.

The film offers, in addition to its fantastical superhero tale, a range of represented computers modeling varying relationships between characters and machines: personal and more traditional computers appear onscreen, used to consolidate the power of evil, as well as to lift heretofore screwups into productive relationships in society. Further, the seemingly integrationist aspects of the film's computing, namely hacker Gus's induction into computing culture, are highly fantastic/utopian in their own right. The 'hacker' in *Superman III* is a perpetually unemployed loser named Gus Gorman (Richard Pryor). We meet Gus waiting in an interminable unemployment insurance line, where, with 35 weeks of benefits already paid to him, he is threatened with removal from the rolls. Hapless and desperate, Gus sees a potential route to solvency on the cover of a matchbook: "Earn big money—become a computer programmer," it beckons. Dreaming of the riches he is sure will accrue to those who get in on the ground floor of the digital revolution, Gus enrolls at the small-time technical college, the "ARCHIBALD School of Data Processing," whose advertising is helpfully bundled in with his matches. Rows of similarly underemployed students are arranged in the classroom, confusedly following the step-by-step instructions of a teacher who paces the room, reading screens over their shoulders. The setting is mundane; there is nothing either magical or threatening in this location, a dreary job-training centre for the minimally ambitious. One female student beckons to the instructor to ask about the capabilities of her machine, only to have her ambition checked by his response: "Oh no, ma'am, computer technology is very advanced, but it can't do *that*." Gus, we soon see, has a natural facility for programming, taking to the machines like a fish to water. Like *Tron*'s Flynn among the programs of the computer's core, Gus demonstrates a virtuosic ability which he cannot articulate or explain, and which amazes his instructor. As in that movie too, Gus's skills do not immediately earn him universal acclaim or even a good job, and we next see him at an entry-level data processing job with Ross Webster's corporation. Lodged in the computing equivalent of a typing pool, Gus wears industrial-grade ear muffs to protect against the noise generated by banks of teletype terminals and whirring mainframes.

The setting does not recall the emerging tropes of personal computing. Nevertheless, this environment is legible as a plausible contemporary large-scale corporate workplace, transformed by computerization: highly populated by busy workers neither élite nor drone-like, who supply the requisite banter and companionship, the work space is blindingly white, as would befit a traditional computational facility. This hybrid space, both visually sterile and collegially peopled, is the lanching pad for Gus's computer-enabled greatness, his soon-to-be rocketing upward mobility. Gus, ever prey to the very human failing of greed, soon finds a way to use the computer in an innovative (if short-lived) get-rich-quick scheme. Uncomprehendlingly attempting to make sense of a paycheque smaller than he figures it ought to be, Gus hears a co-worker make a derogatory, off-hand reference to the fractions of cents that only the computer keeps track of. From being ripped off by corporate computers, Gus makes the significant if short leap to harnessing this bean-counting power to himself: he writes a program to siphon these missing fractional cents from the computer, and has them added to his own paycheque.[19] As these half-cents were lost to employees anyways, Gus figures this victimless crime is foolproof. Certainly, he soon reaps its rewards after easily writing the requisite computer program: Gus embezzles (for embezzlement it is) $85,000 on his next paycheque. More of a small-time crook than a white-collar criminal, Gus cannot avoid detection. The loss of money is immediately apparent to the company accountant. Its whereabouts are not difficult to surmise: Gus shows up at work in a screamingly expensive red sports car, a behaviour that marks him as a "total moron" in Webster's estimation.

The (technically innovative, socially moronic) embezzlement marks a key turning point in the film, the moment at which the evil tycoon, a well-established movie villain by this point (see *Alien*, for example), makes the leap into the digital future. Comparing his notebooks-and-ledgers accountant to the brash, flashy comer in the car purchased with the proceeds of embezzlement, Webster is quick to decide where the future lies: he tells his accountant that "you are yesterday. Whoever pulled this off is tomorrow." Webster offers Gus the choice of joining his evil schemes, or going to prison for the embezzlement. Gus cannot understand his utility to the industrialist's plans. Webster explains: "Computers rule the world today, and the fellow that can rule the computer can rule the world himself." Webster does not point out, nor does Gus seem to notice, that Webster's power is at one remove. The 'computer' he controls is actually Gus. Webster, it seems, has been searching for someone precisely of Gus's abilities, someone to "make these machines do what they're not supposed to do." Namely, Webster wants to extend his "family-owned cartel" of coffee plantations by controlling the weather. This will involve hacking and virtually highjacking the 'VULCAN' weather satellite. Designed to merely monitor and report the weather, apparently VULCAN can be altered to control the weather. How? According to Gus, "like everything else in the twentieth century, we push buttons."

Under coercion/direction from Webster, Gus proceeds on a spree of black-hat hacks, or 'cracks.' The scenes depicting his exploits are a mix of fantasy, plausibility, and slapstick comedy—resembling, actually, Terri Dolittle's virtuoso ineptitude in *Jumpin' Jack Flash*. In a somewhat thin tie-in to the Superman angle, Gus decides to base his VULCAN hack at a machine in Smallville, Clark Kent's home town. Using the traditional hack technique of social engineering—smooth talking one's way around security, rather than forcing entry—Gus reprograms the satellite to respond to his control. Recalling the *pro forma* hack sequence of *Weird Science*, the filmic indices of Gus's success include visual emblems of power diverted: whirring remote tape drives, close-up shots of lights and switches. Typical 'blinkenlights' gestures. But this power re-directed is also demonstrated in computerized technologies run amok: an ATM that won't stop spitting money, a department store credit card invoice claiming a $176,000 bill, traffic signals running haywire to the extent that the animated walk/don't walk pictographs engage in fisticuffs. This more ridiculous montage serves to reference the common fear of the interrelatedness of all computing machines, a dismissive but frustrating sense that the proverbial butterfly in Shanghai could demolish the whole system, and the sense that computers are largely out of control. But it also mocks this sense: battling walk signals? World domination by Richard Pryor? By exaggerating the reach of the computer's operations—and thus of its malfunctions—the film derides as ridiculous the fear of world-dominating computers. In any case, the VULCAN hack completed, a more controlled and criminal mayhem ensues. Webster orders Gus to take over the navigational systems of oil tankers: to send the ships to sea, turn off the pumps, let them wait. Cut to the bridge of a tanker, where frustrated seamen are battling their own computers, which give them directions conflicting with common sense. One lone tanker refuses to heed computer orders, "no matter what that damned machine says."

Webster glories in his seemingly unstoppable path to world domanation via computer control of resources, communication, and transportation. But his success is not total: Superman remains a threat, and Gus, we will see, is not so completely under the industrialist's control as Webster believes. The attempt to use the computer to synthesize superhero-destroying kryptonite, as noted above, fails.[20] The almost-kryptonite thus synthesized does not kill Superman, it just releases his drinking, carousing, cynical alter-ego—it turns him, that is, into "a normal person," in Gus's words. Webster is furious. The film here switches tack, and veers back into the superhero tale: Superman becomes a lascivious, rude, selfish drunk, and the public turns against him. Finally, a decisive junkyard battle between a literally split subectivity—Superman engages in violent combat against himself—sees the man of steel regain his moral standing and self-control.

The use of computers here outlined—developing a space-age machine to control the weather, synthesizing deadly minerals to quiet the defenders of the people, and building a monstrous machine to rain death and destruction upon all comes—hearkens to an earlier era of representation. Films like *Logan's Run*, demonstrating similar machines and tropes, the evil machine is a force unto itself, and it is defeated by sheer human will. In *Superman III*, there is a clear and clearly human agent deploying inert computer power to personally beneficial ends. Also, in the 1980s version of the tale, human will is not sufficient to defeating the evil machinery. Not even Superman himself can defeat this technology. Instead, order is restored by combatting one technical order with another. If the 'evil' computer has no agency unleavened by human will, the human heroes of the piece must use technology of their own to defeat it. Thus it is that after Superman's recovery, he must enlist Gus's aid to ultimately defeat Webster's giant supercomputer, hidden in a desert cavern like so many other scary Cold War machines. Gus's moral awakening is the pivot swinging the advantage to the side of Good. Like Superman, Gus too must make a choice of which path to follow, and while we never see him literally fight himself as does the man of steel, the film shows Gus's progress from pogey, to programming, to criminality and materialism, to a final ethical awakening. In many ways, Gus is the film's central character: a lot more narrative tension and interest accrues to his development than to the always-good, always-triumphant alien superhero. Gus is a populist, topical, narrative Everyman.

Populist figure Gus overcomes cultural disenfranchisement and poverty—and becomes friends with Superman—by joining the information revolution. Glass reads Gus's ascension to hackerdom as fantastical: "Gus's situation represents the fantasy for everyone who, unlike the kids in *War Games*, really are 'ordinary people,' and therefore don't have the means to buy an IBM PC for their very own, nor the education to leap across the technology gap from video game parlors to systems analysis" (24). That Gus Gorman is played by Richard Pryor—at the apex of his fame—is significant to the audience's perception of the hacker as villain, as hapless victim, or as a character to identify with. Glass nominates Gus as the *Superman III*'s priviliged point of view, the character through whose eyes the action is figured (24). But Webster offers a necessary foil, a counterpoint against which Gus's hapless hackerism can be read as, finally, benign. Gus uses the computer to better himself, certainly, but it is hard to overlook the fact that he 'betters himself' by using the computer to commit petty crimes—hard to overlook until this behaviour is contrasted against Webster's avarice and much grander crimes. Gus pads his paycheck with canny computer programming; Webster attempts to bring the global political and economic structures to a standstill by controlling the weather. Gus uses a small personal computer, or a terminal; Webster controls a weather satellite and has a monster computer built for himself. Gus wants to move up from the unemployment rolls; Webster, already in a position of great power, wants to crush his market competition. Like *WarGames*' David Lightman, Gus is a small-time computer user who finds himself suddenly out of his league. Glass notes this resemblance as well, remarking on both characters' status as tinkerers who do not realize the extent of their own power, or the chaos that they are unleashing on others (24). Like David, Gus too attempts to repair the damage his actions cause; like David, Gus lacks the power on his own to do this. As in *WarGames*, in *Superman III* this powerlessness diminishes the perceived threat that Gus poses to viewers' sense of security in culture. Like David, finally, Gus enlists the smaller computer to defeat the larger—both are empowered by the personal computer in ways that make us identify with rather than fear them as virtuoso technical agents.[21] Glass also reads Gus as 'the little guy' living out a widespread cultural fantasy, a dream of computer power: "This particular dream taps a deep social root today: the belief held by millions of computer-illiterate Americans that knowledge of computers is a ticket to jobs, money, power—especially the power *felt* to be the computers'" (25). This is a fantasy, indeed.

***"Why 1984 Won't Be Like* Nineteen Eighty-Four"**

James Twitchell, choosing this commercial as one of his *Twenty Ads That Shook The World*, claims that the "1984" spot inaugurated the positioning of the advertisement as *pseudo-event*: while today nearly as many people watch the Superbowl for the outlandish advertisements (like the 'Budbowl' Budweiser beer campaign of recent years), it was "1984" that was the very first event-ad (189). As with subsequent ads prepared for debut during the Superbowl, the Orwellian Macintosh spot was intended to grab attention, and grab it did, aired and re-aired not as paid advertisement, but as a news and content item by many outlets (Campbell-Kelly and Aspray 274). To this day, it is is offered over the Internet by fans, and analysed both in terms of its startling marketing tactics, and for its status as a key cultural document.[22] Levy, for one, calls the ad "notorious" (*Insanely Great* 172); Twitchell recites the love-it-or-hate-it critical press that names it either brilliant or pompous (189); computer historians Martin Campbell-Kelly and William Aspray describe the Macintosh launch as "one of the most memorable advertising campaigns of the 1980s," and consider the Superbowl spot a "spectacular television advertisement" (274); Paul Cerruzzi calls the ad "legendary" (274). In the introduction to this chapter, for my part, I named the Apple "1984" ad as exemplary of the ways the personal computer is rhetorically and narratively constructed from the materials provided by the legacy system of representation accumulated over the late-nineteenth and twentieth centuries. Its debts to this legacy system are numerous and complex and help to account for its continuing iconic status: the ad recalls classic dystopian scenarios, most obviously Orwell's *Nineteen Eighty-Four*; it invokes classic negative imagery calling a former vision of computing to mind; it piggybacks on the bleak chic of cyberpunk literature and some film (Ridley Scott directed both *Alien* [1979] and *Blade Runner* before the "1984" ad). Finally, it poses against this negative backdrop a 'personal' computer which will liberate viewers from the recognizable technoscape it indexes, hence its status as a fundamentally utopian text.

Visually and aurally dense, the ad operates primarily, paradoxically, on the iconic register. There is simply too much to take in in the ad—most viewers walk away with the shivers, but a poor recollection of the shot-for-shot progress of events. Twitchell notes viewers' poor recall for the details of the ad: "[a]sk someone who has seen the ad and they usually say there is no spoken language in it at all" (187). Instead, viewers get a *sense* of the ad, a *feel* for what it depicts. "1984" is more than the sum of its ill-recalled parts. The ad is an aesthetic and emotional response to computing, designed not so much to generate a purchasing impulse but to evoke a particular set of associations, to promote a particular world-view, that opposes monolithic computing with the personal-use Macintosh. The core layer of iconography is the Orwellian one: the Big Brother figure on the screen, the date of the commercial's airing, the overt referencing of *Nineteen Eighty-Four* in the sole intertitle text of the concluding moments of the ad. This is a very powerful association to evoke, especially at the opening of the calendrical 1984. Writing in 2000, Twitchell recalls that "a generation ago, the mere mention of the date rattled all who heard it. It should have. For here was a book to conjure with. Here was a book that was not just a political allegory of the modern state, but also a guide to the symbols of modern life" (186). The "1984" spot conjures indeed, superseding Orwell's technocratic dystopia with smaller technologies undreamed of in Orwell's vision of Oceania. Orwell's novel saturated popular culture from the end of 1983, and through the following year. Twitchell suggests that Scott's citation of *Nineteen Eighty-Four* rewrites that cultural text indelibly, with the effect of "remov[ing] Orwell's novel … from the reservoir of cultural literacy" (186). That is, the "1984" spot is so powerfully evocative that it gathers all the prior text's associations to itself. This was the intended effect of the campaign: indeed, Chiat/Day, the advertising agency charged with the account, was so worried that one of the 'Baby Bells' or other computer companies would piggyback Orwell's novel that they discreetly researched other campaigns to ensure they had the concept to themselves. In Apple's appropriation of the novel, Winston Smith would cherish a personal-use Macintosh rather than a carefully-bound paper journal and deliberately anachronistic pen.

Spectacle aside, the ad presents a complex filmic text. Director Ridley Scott, as we have seen in the discussion of *Blade Runner* in Chapter 2 above, considers his filmic works as "700-layer cakes," building story on mise-en-scène, idea from gesture (Bukatman, *Blade Runner*). Steven Levy thus notes the ad's literary and cinematic intertextual affiliations, claiming that "it had all the cyberpunk film noir of [Scott's] recent cult hit *Blade Runner*, and a more coherent plot" (*Insanely Great* 172). Scott, we shouldn't forget, was also well-versed in the direction of ads and music videos, evidence of which we see in "1984" strong visuals and fast pacing. More generally, though, the ad feels like a movie: it features lavish production technique, carefully calibrated soundtrack, and lacks the overt markers of the advertising-text genre. In Twitchell's view it presents "all the stuff of German cinema filtered through Hollywood, not American commercialism filtered through Madison Avenue" (Twitchell 188). The ad thus generates a certain amount of awe in the spectator, a recognition that its meaning is layered into the filmic codes, that it requires attention.[23] The ad references the German Expressionist movement, with its harsh contrasts, its waves of bodies arranged symbolically, its aestheticized sets: the ad recalls Lang's *Metropolis*, with all the associations we saw this film to evoke in the legacy system of the previous chapter. Sarah R. Stein notes the sophisticated visual organization of the ad, its complex references to pre-existing texts. Viewers consequently employ particularly cinematic codes to read it.

Over its one-minute running time, the ad establishes four main characters, two individual and two aggregate, and telegraphs a narrative of a legacy-style totalitarian collectivism overthrown by an individualistic liberal humanism, the latter supported by a single-user consumer computer technology and the former, presumably, by older technologies. Using mostly visual and editing cues, along with soundtrack, and sparing and careful use of monologue and voiceover, the ad packs a connotative wallop with little denotative explication. Like the critical/dystopian cyberpunk text, part of the ad's effect is achieved in its destabilization of viewer/reader comfort and knowledge in their experience of the ad-event: remember that the spot aired only once, in the middle of a football game. Nevertheless, the ad is amenable to sustained analysis. Stein undertakes a careful formal reading of the "1984" ad in a chapter of her 1997 dissertation, and this is an endeavor that bears repeating here. The ad begins *in medias res*, with a very brief master shot establishing a futuristic location—a narrow numbered tube of unknown dimension or scale—vertiginously depicted from above. The camera zooms in closer, a panoptical effect not repeated in the rest of the ad, where the camera is static, or tracking: something pulses in the tube. Cut to what must be the interior of the tunnel, where grey-uniformed men march in lockstep down what Stein likens to a subway, a tubular passageway lined with glowing television screens. As the camera now cuts in closer still, a pulsing row of near-identical faces—some wearing gas masks—move in diagonal forward and out of the frame; a series of marching feet perform the same movement. The film cuts to another static midshot; a wave of moving bodies files into order in an auditorium. The assembled mass sits with faces uplifted toward a telescreen. Throughout this sequence, either the camera or the wave of men is always in motion, and the composition is always diagonal, obliquely rather than directly addressing the visual field, in a sort of technical lack of eye-contact. The only direct shot shows them from behind, so many symmetrical bobbing heads in formation. Several lighting, composition, and wardrobe cues allow viewers to infer that these men are not particularly happy: the grey and shapeless uniforms, the shaven heads, the downcast looks, and the ominous mechanical rumbling of the soundtrack do not connote joy. The men, further, are never individuated: even the tightest shot is framed to show the men in aggregate, as a mass of bodies or body parts, rather than as subjects wholly composed. This sequence establishes the men as a subjugated group, as a mass. There is another such group established in the ad. Intercut with the depictions of the shuffling mass, the camera cuts back to the long hallway, showing another group of men, black-uniformed, with their faces obscured by what look like riot shields and helmets with mirrored face-guards. These men also move in lockstep, represented in the aggregate: they run directly into the camera, a bobbing faceless mass bearing truncheons, connoting force, military presence, ominous vigor—they are likely a security force. If the workers have been filmed on the diagonal so that viewers do not see them head-on, and from which vantage they cannot address their gaze to the camera, the security force is aggressively frontal; however, with mirrors where their faces should be, such a posture is more hostile than open, and they remain unindividuated, unhumanized ciphers. The entire sequence is quickly paced and tightly-shot, a montage of misery and oppression, by turns.

Only two figures are individuated by the camera, shown as unique and agential subjects. One is the talking figurehead on the large telescreen, the Big Brother from whose mouth issues the screed that is the main diegetic dialogue of the piece. His speech runs thus:

> For today, we celebrate the first glorious anniversary of the Information Purification Directives. We have created, for the first time in all history, a garden of pure ideology. Where each worker may bloom secure from the pests of contradictory and confusing truths. Our Unification of Thought is more powerful a weapon than any fleet or army on earth. We are one people. With one will. One resolve. One cause. Our enemies shall talk themselves to death. And we will bury them with their own confusion. We shall prevail![24]

As Twitchell notes, though, viewers tend not to remember the substance of the narration: it is aural wallpaper, a string of negative keywords drawing from the Orwellian well—"ideology," "truth," "weapon," "confusion" (187). Big Brother's face fills the screen-within-the-screen, overruns it, even, as his forehead and chin exceed the boundaries of the frame. He is lit harshly, unflatteringly: strong overhead light emphasizes the hollowness of his cheeks and the length of his nose, and causes his glasses to glare and to cast dominating shadows across his face. The man appears to be elderly, and the voice-over is dry and shrill: Stein observes that "he appears hollow-cheeked and steely-eyed, the cinematic stereotype of the psychopathic tyrant."[25] He appears hardly human, and is dehumanized further by the fact that the voice track we can ascribe to him does not synchronize with his lip movements. His speech, further, is reproduced as text on the same screen from which the man speaks, a screen that contains him, and frames him with 'computerish' sidebar text and a flowing text-track. He is fully integrated into the machine, an eerie telepresence who ultimately, like his literary forebear, be nothing more than a propaganda tool of a central governing committee.

The ad's other individuated agent is a woman: blonde, tanned, dressed in red running shorts and a blazing white tank top, looking vigorous and fully resident in her body, and wielding a sledgehammer. She is the hero of the piece; she stands for Macintosh (remember? This is a computer ad?), a stylized line-drawing of which she wears stencilled onto her shirt. She appears in flashes of increasing duration during the ad. In scenes lasting only a quarter of a second, signalled on the soundtrack by an twinned two-octave electonic bell tone, the woman flashes like a lightning bolt through the dystopian landscape.[26] She appears in five separate sequences: the first two, nothing more than flashes a fraction of a second long, show the woman framed in mid-shot. She is running. She is closer to the camera in the second shot. In the third and fourth depictions, the camera has receded to a long-shot frame: again, the woman runs straight into the shot. In these longer shots, we can see that the black-suited guards are chasing the woman: as she runs into the assembly hall in her third appearance, they pour in after her. She is clearly exerting herself: her mouth is open, her (ample) breasts heave. Reversing the effect of the first two depictions, in the third and fourth depictions, the camera has receded and we see the woman running into the frame; also, in this longer shot, the black-suited guards have disappeared from the visual field. This odd effect of the disappearing throng of pursuers strongly individuates the woman. The all-over effect is one of vitality, of approach, of speed of movement: the woman moves faster, runs farther, is shown in full. In its brief, flashing appearances in an unrelieved grey canvas, the woman's body is spectacular: tanned, glistening, obviously human in its muscular straining, in the movement of the woman's breasts, the sweep of her hair as she runs. In all four of these sequences, the woman and the camera are in direct alignment: none of the workers or security guards are treated to this direct gaze, nor can they return it. The intimacy is startling. In her fifth and final appearance, the woman is at once heroically and intimately treated: occupying most of the frame, the woman is shot from below, aggrandized. We are 'close' enough to hear her panting. She is swinging the hammer, rotating her whole body. Her actions are intercut very quickly with shots of the advancing guards, the talking head: As Big Brother intones "We shall prevail," she releases the hammer with a cry. It swings through the air, smashing the screen in a blaze of light.

This is the climax of the ad: the glow of the smashed idol illuminates the open-mouthed faces of the assembled grey masses as the camera tracks quickly from the front of the auditorium over the uniform group. A non-diegetic voiceover (the first to distract us from the filmic narrative, and pull us back into ad-space) begins, reading a script duplicated in scrolling text that overlays the workers, moving up from the bottom of the frame toward the centre, accompanied by a whooshing soundtrack: "On January 24th, Apple Computer will introduce Macintosh. And you'll see why 1984 won't be like '1984'". The voice is male, mellifluous, perhaps vaguely ironic. As he nears the end of the speech, the screen first fades to black, then reveals the coloured Apple corporate logo. As he intones "won't be like '1984'" the screen shows the Apple; for "like '1984,'" the whooshing has stopped, emphasising these final two words in an eerie silence. The "1984" spot operates on several registers, and performs differently on each: salesmanship, though, was not an arena in which it was fated to be successful. Apple board members disliked the ad so much after a preview screening that they tried to sell off their two Superbowl ad slots: stuck with one $500,000 one-minute slot they could not sell, they decided they might as well run the ad despite their misgivings. Test-market screenings of the ad, occurring in late December 1983 somewhere in the midwest US, demonstrated keen audience rejection of the concept: according to market research undertaken at the time, the ad scored substantially more poorly than any other business machine commercial ever tested

(Levy, *Insanely Great* 172; Twitchell 188). In addition to evoking a specifically Owellian dystopia, Apple's advertising campaign explictly references an earlier, to-be-displaced, paradigm and imagery of computing in its deliberately deflationary slogan. Describing the Macintosh as "a computer for the rest of us" in the print campaign that followed the "1984" spot serves to distinguish the new Apple machine from what had become the standard computer of the lay imaginary.

Utopian Dreams, Revolutionary Rhetoric

While much of Apple's early marketing campaigns were carefully integrationist, the company also followed another, fantastic/utopian tack in its ads for the Apple II (after 1977) and Apple III (after 1980): coopting historical figures into a narrative of personal computing. Generating anachronistic evocations of the surmised computing practices of Thomas Jefferson, Benjamin Franklin, and Orville Wright, these ads promote an association both revolutionary and entrepreneurial to their machines. This campaign, and another in which the company runs a contest to reward idiosyncratic use of the machine, is at once utopian, politically conservative, and nostalgic. Promoting the agency of the new machine in revolutionary activities, the ads are utopian in suggesting that lone human figures supported by personal-use machines can attain the status of revered icon. By referencing the founding myths of the American nation, the ads tap a well of pre-lapsarian optimism, a sense of new beginnings, new freedoms, and an anachronistic vision of the American union as idealistic and iconoclastic. However, the constant reiteration of the mythic glories of the political past, and the stereotypical and cartoonish depiction of historical figures, marks a certain conservatism: if your revolution is 200 years old, how revolutionary can it be?

In the first set of ads, we see the historical figure in question, in period dress, hard at work building the American nation—using an Apple computer. These ads are utopian because they recall the myth of the founding of the American nation, invoking historical narrative to ally a political idealism to technological innovation—that other particularly American myth of better living through engineering. According to one headline, "Jefferson had one of the best minds of 1776, but today you can make better decisions with an Apple."[27] Like the famous Clairol hair colour slogan—"You, only better"—that pitched hair dye as an extension of your own ideal hair, rather than a cheat on nature, this anachronistic likening of revolutionary figures to modern-day personal computer-owners suggests that, had Jefferson used a computer, he would be Jefferson, only better. Similarly, the headline of the Benjamin Franklin ad asks, "What kind of man owns his own computer," and the ad implicitly answers: a revolutionary, one smart enough to fly virtual kites in virtual lightning storms.[28] With an Apple, then, Franklin is still an inventor and a scientist, only better. While minimizing the estranging aspects of new computing technologies, much like the integrationist texts, this re-writing of cherished popular historical figures as computer users also works to rewrite American history as the history of technology as well as of great men: it's American history, only better, a formulation that recalls Bolter and Grusin's reading of a particularly American desire for salvation through technological fixes.

As much as they promote new computing technologies and radical new practices, the ads are deeply nostalgic, depicting smiling and well-scrubbed icons of American political and engineering history in carefully anachronistic settings. A second ad featuring Jefferson is a longer, two-page spread, titled, "The man, the revolution and the Apple," a grammatical parallelism that elides a hefty logical and chronological linkage of 1980s technology and 1770s political activism—and links both with individual rather than collective agency. The Ben Franklin ad shows 'Franklin' gazing in obvious wonder at a colour display of a simulated kite—his own famous kite sits neglected in a corner. His face is lit by the glow of the monitor. Orville Wright also gets his own Apple-sponsored retelling: this ad is modelled on the two-page Jefferson spread, with identitical layout and a similar headline, "The man, the wing and the Apple."[29] Wright is depicted, in turn-of-the-century period dress and fully mustachioed, in a log cabin *cum* flight lab. The setting is rustic and cluttered: it looks to be a living as well as lab space, with rows of teacups and canned goods lining plank shelves along rough walls. A work bench underneath is laden with similarly rough tools. The floor is unfinished; the ceiling is low. Occupying the bottom half of the photograph, and dominating the foreground, 'Wright' smiles and gestures behind him, towards an Apple III whose monitor displays a schematic of Wright's biplane. Behind the computer, nearly in the background of the frame, a young assistant leans against a full-sized double-wing model. The visual symbolism is clear: between inventor and invention lies the computer. The Apple sits pristine atop a battered chest, displaying a perfect plane model—despite the lack of electricity and without a human agent at its controls. The ad copy reinforces this power of simulation: "With a highly-integrated system from the extensive Apple personal computer family, Orville and brother Wilbur would have increased their productivity. Perhaps even launched the Kitty Hawk Flyer well before 1903."

The Jefferson ad text claims that an Apple owner is a fit interlocutor for the revered historical figure, and makes the link between home computer revolution and colonial revolution even more explicit—Jefferson "could tell you about the American revolution. You could tell him about the technological revolution."[30] A sub-heading to this print ad carries the comparison further, asking the addressee to "Declare your independence with Apple," clearly invoking an association between the small machine and Jefferson's participation in revolutionary America's declaration of independence.[31] As in the Jefferson ad, the reader is invited to set him or herself on a par with a powerful historical figure: Wright could "tell you the problems he faced as a turn-of-the-century engineer. You could tell him all about the technological solutions" now available to product development quandaries—"the Apple personal computer." Note that this ad continues to stress the personal aspect of computing, the personal use of the Apple. Coupled with the evocation of strongly-individualized historical figures, this repetition of the personal use intended for the machine creates a heroic narrative of individual achievement: there is no 'we' in 'Apple.' This construction is utopian and plays on dreams of personal fame and accomplishment. Appropriately, a swallow wings its solo way upward out of the ad.

The ads are nostalgic on another level as well: linking Jefferson's writing of the American Declaration of Independence to word processing, Wright's invention of the airplane to computer-aided design (CAD), and Franklin's scientific experiments with lightning to digital modelling, the ads position the computer as a productive technology, involved in the production of physical artifacts, with visible material impacts. This contra Fredric Jameson's apt assertion that the second machine age featured machines of production, and the third, reproduction. Attending this shift is a sense of the loss of dynamism, visible power, and motion that made the steam engine, the railway, the dynamo, and even the room-sized supercomputer such powerful icons. The icon's operations are no longer apprehendable. Linking the Apple II to prized physical artifact and experiences marks it as a akin to these. In this light, consider another of Apple's early campaigns, an ad for a contest running until March 31, 1980, in which Apple asks its users what its own machine is good for: "What in the name of Adam do people do with Apple Computers? You tell us," it asks, in a thousand word essay. The ad is illustrated with a naked 'Adam' depicted in a Garden of Eden setting, holding an Apple II where we might expect instead to find … a fig leaf? The headline claims "We're looking for the most original use of an Apple since Adam."[32] "Independent judges" would award prizes in nearly ten different use categories, and the ad encourages the submission of any kind of usage-anecdote at all. Such a contest indicates both the emptiness of the sign 'personal computer' at the turn of the decade, and the excesses of representation to which it was prone.[33] Metaphorically, the personal computing industry in 1980 was in its own Garden of Eden state, all pre-lapsarian innocence, without the weight of history to dampen utopian dreams. Pamela McCorduck, too, entwines the corpate Apple in Edenic context, writing about "Books were my generation's apples—the serpent beguiled us and we did eat. And loved it. But the next generation's Apples are something else," the nature of which, along with the Apple marketing team, she can only speculate on (45). This ad offers the freedom to inscribe the *tabula rasa* with a populist, pluralist computing, a realm of endless potentiality where idiosyncratic use is prize-worthy.

Technological Optimists

McCorduck's book, *The Universal Machine: Confessions of a Technological Optimist* (1985), is a wide-ranging and thoughtful treatment of the computer in society, a mass-market work that aims to explain to a lay audience the various technical advances in the field, as well as to promote a certain utopian technophilia. She opens on a celebratory and hopeful note: "Something is happening all around the planet. In the words of Mr. Boubacai Kâne, who directs the project in Senegal that is teaching that schoolgirl how to program, 'With the computer, for the first time in the history of civilization, we are all starting at the same time'" (2). In McCorduck's estimation, the computer revolution is clearly upon us:

> From art to medicine, from agriculture to transportation, from science to entertainment to commerce, even in war and peace, the computer is making a place for itself. Here it comes into our lives, this inevitable engine for the Age of Symbols.... It enters because we want it, we need it, a human machine in a way no other ever has been. (2-3)

McCorduck mixes a solid knowledge of artificial intelligence, computer programming with a broad social understanding of economic and political factors influencing the technologization of culture, ranging from the introduction of the printing press to an awareness of a creeping infoglut paralysing knowledge workers. Nevertheless, her optimism for the promise of new computing technologies is palpably eager, and border on the naïve, a fact of which she is unrepentantly aware. Responding to a rhetorical question about her passion for the new technology, she writes: "How do I dare? Because in the last half of the calamitous twentieth century, the human race has fashioned the most civilized tool ever made. It is called the computer. Having fashioned it, we have in the main embraced it rapturously: it changes our lives more and more each day" (15). For her, the "invention—the inevitable invention" of the personal computer "liberates and magnifies the human property that has always served us best, our own intelligence" (17). McCorduck's work is the paradigmatic utopian text, expressly proposing the spread of personal computer technologies as an essential component of meaningful, progressive social change—despite her quite sophisticated awareness of the complexities of the historical, political, and economic factors that make us human culture.

There is no shortage of other technological optimists singing in the same key: Steven Levy's *Hackers: Heroes of the Computer Revolution* (1981) is a veritable love letter to the nerds and misfits who had a dream of personal, interactive, computing, and dedicated their lives to making it happen. Hackers, according to Levy, though generally thought of as "nerdy social outcasts," were actually "digital explorers": "Beneath their often unimposing exteriors, they were adventurers, visionaries, risk-takers, artists … and the ones who most clearly saw why the computer was a truly revoultionary tool" (8). Promoting by turns access to institutional machine resources, better programming, fun and games, social justice, political activism, and anti-trust—as well as creating some of the most profitable start-up companies in American history, and creating a global military-funded computer network—hackers are heroes in the iconoclastic American mold, and the machines they build, by extension, are revolutionary and liberatory. Nevertheless, hacker utopias are a little more communitarian than most people are comfortable with; Tracey Kidder's *The Soul of a New Machine* thus traces the slightly-less-hippie-inflected engineers and entrepreneurs at a Boston-area computer company as they develop a new machine for market. This book, which won a Pulitzer Prize, opens with an anecdote heroizing the company's leader, a man who was not only good with algorithms and wires, but apparently had sea legs to make a professional sailor envious—the work opens with a heroic anecdote the entrepreneur's stoic weathering of a storm at sea on a pleasure cruise of New England. Similarly, Freiberger and Swaine's *Fire in the Valley : The Making of the Person Computer* lionizes both the oddball-hackers and the wildly-successful entrepreneurs, opening their second edition of this book with a preface that characterizes the late 1970s and early 1980s as "a time when cranks and dreamers saw the power they dreamed of drop into their hands … when multinational corporations lost their way and kitchen-table entrepreneurs seized the banner and pioneered the future" (xv). The authors name this period as the time when "idealism paid off," a telling locution conflating financial reward with utopian impulses (xv). Works like McCorduck's, Frieberger and Swaine's, Levy's, and Kidder's each promoted heroic subjectivities to accompany new computing technologies, and offered different flavours of computer-age utopia: communitarian-meritocratic and corporate-entrepreneurial.

Macintosh: Utopia for the Rest of Us

A shiver-inducing ad, provoking reactions of dread and stupefaction in viewers, the "1984" ad was a one-shot deal, not a campaign. The "1984" ad, thus, is followed up by a tremendously expensive campaign costing in the realm of $15 million (more than $30 million in today's dollars) resulting in what Campbell-Kelly and Aspray describe as a "blaze of publicity" (274-5). A strong print and television campaign blanketed popular culture with glossy multi-page spreads and inserts in "affluent" magazines (Campbell-Kelly and Aspray 275). In the legacy system of computing, as we have seen, 'the computer' as the most modern of modern technologies had taken a real drubbing since the mid-1960s, notably in the figuration of the creepily anthropomorphized HAL 9000 from *2001: A Space Odyssey,* a machine whose fame has extended well beyond those who have seen Kubrick's film, becoming a shorthand representation for engineering that flies too close to the sun.[34] While a machine like HAL may be necessary to command space exploration and murder hapless astronauts, 'the rest of us' hailed in Apple's interpellative call have less grandiose needs, likely to be best served by the all-in-one, small beige box with the friendly rainbow apple icon attached to it. And those who aren't 'the rest of us'? Leave to them the HAL 9000s, the IBM System/360 series minicomputers, the huge computers to manage airline reservations: these computers are, according to this us-versus-them construction, a whole other kind of machine, for a whole other kind of use, a set of machines with such a bad reputation among ordinary consumers that marketers must do their best to disavow filiation entirely.

This disaffiliation was perhaps too successful, and Apple machines gained a utopian taint that made them too different, in a kind of counterpoint to IBM's canny explotiation of sameness in its construction of the Personal Computer. Accounts of Apple's defining corporate culture, indeed, its cult of personality, abound. The Macintosh quickly developed a lore of its own, with legions of fans detailing its corporate and market history, proselytising the non-believers, and narrating a Macintosh-based computing utopia, where nice people build great machines for true believers—a narrative opposed to the 'evil empire' model ascribed first to IBM and the clones, and later to Bill Gates and his Microsoft hegemony. Such a great fog of hyperbole, what early reviewer Gregg Williams calls "the history of colorful rumors" (30) and Campbell-Kelly and Aspray name "a powerful mythology" (271), so clouds our vision of the physical machine it centres on that it is difficult, sometimes, to see the Macintosh as an engineered machine, a consumer product, a computer deployed into real-world use. As machine, the Macintosh is a complicated cultural text—

striking a rich chord among users, reviewers, and pundits, the Mac was a machine reacted to emotionally. People loved it or hated it, but were rarely indifferent to it: the Macintosh as object relates an explicitly fantastic/utopian narrative that, despite the wishes of its corporate backers, necessarily provoked an emotional response. Contrary to IBM's "deliberate decision to produce an evolutionary machine," a strategy whereby the company carefully repackaged the best of the already-successful, the Macintosh was designed as a world-changer (Ceruzzi 273). In this vein, Neal Stephenson, retrospectively examining the period, writes that for many users the Macintosh "was seen as not only a superb piece of engineering, but an embodiment of certain ideals about the use of technology to benefit mankind" (23). Stephenson suggests that these ideals are rooted in Apple's corporate culture, its cultivated and then repudiated reputation as a manifestation of "hippie" ideals, its self-image as "creative and rebellious freethinkers" (31). These ideals were embodied in the designed machine, and also transmitted in a massive advertising campaign that followed on the heels of the "1984" Superbowl spot.[35]

Campbell-Kelly and Aspray note that "[t]he Macintosh combined the working methods of the hacker with a high degree of aesthetic creativity" and claim that "[i]n its unique and captivating case, the Macintosh computer was to become one of the most pervasive industrial icons of the late twentieth century" (273). Rightly lauded for its elegance, the main Macintosh unit resembles nothing that had come before it. Standing taller than it was wide, the Mac presents a clean façade: a single-tone grey rectangle, with rounded edges, a 9" screen taking up the upper half of a field which tilts slightly away from the viewer. On the bottom left of the façade a small coloured Apple logo sits. A thin, recessed slot to the right awaits the insertion of the new, smaller, more durable, hard-cased 3.5" disk.[36] There is a small recess at the very bottom of the façade, into which the keyboard tucks nicely. Other design niceties: a built-in carrying handle integrated invisibly into the top of the unit, and a "clever venting" scheme mitigating the need for a system fan (qtd. in ad).[37] Of course, the Macintosh is more than a pretty box on a desk—it's a computer and in its functioning is also very different from what came before it. So let's examine the Macintosh as designed object, as computing machine.[38] Most obviously, the Macintosh was the first accessibly-priced consumer machine to feature a graphical user interface (GUI).[39] Users were to point and click their way around the Macintosh's environment. And this environment on the screen was a new as the box itself: the bit-mapped gray-scale display, 512 x 342 pixels, reversed the usual order of things, offering a light ground against which to create dark marks (typing, drawing). This made the screen seem more akin to using pen and paper than to using other computers. The Macintosh was comparatively diminutive: its 'footprint'—the amount of desktop space it claimed, was "amazingly small" according to the *Byte* review (Williams, "Macintosh" 35). The base of the machine took up fewer square inches than a standard sheet of typing paper: the Macintosh measured 10" by 10", and stood 13.5" high, a proportion that *Byte* remarks on as "pleasantly compact and light" (35). It weighed less than other machines—according to an early ad, at 16 pounds, the Mac was "9 pounds less than the most popular 'portable.'"[40] The Macintosh system came packaged as three simple pieces: a keyboard, a mouse, and the main computing/display unit.

The keyboard, an element we have seen to be so important to the IBM PC, attempted a bit of radicalism by omitting cursor keys, those command-line holdovers of video teletype display. As Campbell-Kelly and Aspray note, the command-line interface "like so much in early personal computing, … was derived from mainframe technology … the notoriously efficient but intimidating Unix operating system" (264). Jobs was adamant that users be forced to 'mouse' in the Mac environment, believing that necessity would convert them to the wonders of the graphical interface. Omitting cursors, the numeric keypad, and function keys, the Macintosh keyboard was radically simplified. It was also smaller and less visually cluttered—it boasted a minimal 58 keys, compared to the IBM-standard 81.[41] They keyboard plugged into the main unit via a telephone jack at the front of the machine: simple and easy. The keys sit fairly high on the keyboard, and have an odd 'puffy' quality to them that makes the keyboard seem toy-like and disarming. Like the keyboard, the Macintosh mouse, too, was designed for ease of use, with one button: the caption text accompanying the illustration of the mouse suggests that this simplicity makes it "extremely difficult to press the wrong one." Using the mouse also allows users to avert the tedium of learning arcane computer commands: "the Mouse itself replaces typed-in computer commands with a form of communication you already understand—pointing." The mouse is boxier than we've become used to; however, it hints at ergonomic considerations by slanting up from its base in a manner suggesting the curve of a hand. Its software was just as remarkable—and just as different from the standard. According to Ceruzzi, "The Mac's elegant software system … displayed a combination of aesthetic beauty and practical engineering that is extrememly rare…. [S]omehow it just felt right. Ultimately, this feeling is subjective, but it was one few would disagree with" (275). The Macintosh is a visually stunning machine, a carefully designed physical presence. It was fastidiously devised to meet exacting aesthetic standards, as well as, or as part of, meeting technical benchmarks. Steve Jobs and the Macintosh team were concerned with the whole package: the Mac was to be small, beautiful, quiet, portable, and easy to use (Levy, *Insanely Great* Chapter 6 *passim*).[42]

The Macintosh, in short, is a smooth, clean object—the opposite of the blinkenlights variety of computer we have seen to populate dystopian filmic representations, and of a different nature entirely from knob-heavy, industrial-ugly, one-generation-away-from-homebrew personal computers offered by other manufacturers.[43] It is self-consciously and deliberately *different* and it seems to aim at its own personal computer revolution. In a sense, the Mac is an 'embodiment of certain ideals about the use of technology' as Stephenson suggests. It is difficult to break this vision into separate technical and aesthetic considerations: the Mac design team was working on a whole-machine vision explicitly aiming to alter the computing practices of the whole personal computing market, and to extend this market even further into non-expert use. Throwing down the gauntlet, one exhortatory ad's final tagline claims that "Soon there'll be just two kinds of people. Those who use computers. And those who use Apples." This turned out to be mor true than perhaps its copywriters had intended, as Ceruzzi relates that "[a]mong sophisticated customers … one group favored the elegance and sophistication of the Mac, while others preferred the raw horsepower and access to individual bits that MS-DOS allowed" (276). He describes, though, the Mac's utility to "priesthood" outsiders as "a godsend" (276), marking the machine as indeed more popular among the lay population than among the cognoscenti. Another early print ad for the Macintosh narrates a like-minded fairy tale vision of the machine, moving from "the olden days" into the Macintosh-powered future, where "if you can point, you can use a Macintosh." The ad doesn't offer much in the way of technical information, but it has a creation myth lined up: "on a particuarly bright day in California, some particularly bright engineers had a brilliant idea" to make computing more accessible to people, rather than the reverse: "So it was that those very engineers worked long days and late nights—and a few legal holidays—teaching silicon chips all about people."[44] The result of all this dedicated brilliant hacking? An oddly anthropomorphic computer buddy, "a personal computer so personable it could practically shake hands." Sure enough, the computer picture below this text features a MacPaint drawing, a lower-case bit-mapped hand-drawn script saying "hello."

To drive home the point that this is a machine for non-experts, a machine fundamentally different even from very recent personal computers, the ad's text concludes by invoking and dismissing "computerese" explicitly: in naming the new computer the Mac team "didn't call it the QZ190, or the Zipchip 5000. They called it Macintosh." Indeed, it is difficult to describe the Macintosh without referring to its differences from other personal computers—the Macintosh invites the same kind of rhetorical revolution-mongering as do the personal computers earlier in the decade and how they sought to differentiate themselves from 'computers.' This might be part of the problem. Macs did not sell very well initially, failing to meet Apple's expectations. There are several possible reasons for this. Critics, reviewers, fanatics, and historians alike agree that the original Macintosh had some serious design shortcomings: with 128k of RAM, it lacked the oomph to run serious applications; without a hard drive, its storage capacity and utility for big tasks was severely compromised; its clock speed of 8Mhz was already obsolete and slowed its performance. Further, at $2,495 (about $5,000 today), it was too expensive a gamble for most entry-level consumers; *Byte* reviewer Williams, acknowledging that "the Macintosh is a very important machine … [and] brings us one step closer to the ideal of computer as appliance" nevertheless claims that "the Mac is still too expensive to penetrate the home market significantly" (54, 53).

Another less obvious reason may be that the Macintosh proposed a utopia that could not generate a following. By 1984, the 'personal computer' has already been represented as a distinct object for around seven years: it is beginning to be established as a thing-in-itself, as distinct from the 'computer' comprehensible at the end of the 1970s. To launch the Macintosh in the narrative orbit of *Nineteen Eighty-Four* (and, of course, that of the calendrical 1984) is, at any rate, to guarantee that the new machine—or the ad promoting it—becomes part of the year's *Zeitgeist*. The ad was spectacular, a spectacle. It invokes the full power of 1984-powered paranoia, and posits an as-yet-unseen, untested personal computer as the solution to despotism, totalitarianism, and ugly clothing. This ad establishes the negative ideal, and offers the Macintosh as solution. Cerruzzi reads the ad as a utopian decree, a manifesto in which "Apple promised that the Macintosh would prevent the year 1984 from being the technological dystopia forecast by Orwell's novel" (274). Stein supports this assertion: she notes an additional tension in the ad, not between legacy computing and the brave new world of personal computing, but between the kinds of personal computing offered by IBM and the clones, and Apple's deliberately populist and utopian Macintosh. Ceruzzi describes the evolutionary nature of the "home computer revolution" under the heading "The Better is the Enemy of the good": tracing the lineage of the hardware undergirding the revolution, Ceruzzi notes that its founding chip had been designed for a terminal, its operating system calcified around a quick fix temporary setup never devised as a standard, and its working memory was arbitrarily constrained (272). When the personal computer was established as a force in the cultural landscape, "[t]hose visionaries who had predicted and longed for this moment now had mixed feelings. This was what they wanted, but they had not anticipated the price to be paid, name, being trapped in the architecture of the IBM PC and its operating system" (273). Relating how the ad was shown to the Apple faithful by Steve Jobs at the MacWorld Expo in early January 1984, Stein quotes Jobs's speech:

> It appears IBM wants it all…. Dealers initially welcoming IBM with open arms, now fear an IBM-dominated and controlled future. They are increasingly and desperately turning back to Apple, as the only force that can insure their future freedom…. Will Big Blue cominate the entire computer industry? Was George Orwell right about 1984?

Apple, that is, set the Macintosh against the emerging standards of personal computing, promoting yet another revolution in a very new field. Stein diagnoses an incipient disenchantment with the personal computer revolution by 1984, for which the Macintosh acts as a corrective: "the emergence of a new form of computer that was to revolutionize the consumer market once again called on new ways of representing re-enchantment."

Apparently, enchantment and personal computing had irrevocably parted ways by 1984, with each discourse taking on incompatible gendered connotations. David Gelernter, wondering at the Macintosh's market failure, ascribes to the machine a cult of beauty—elegance, well-designedness, "rightness"—that doomed it to the label of "cuteness" and its users to the category of (feminized) aesthetes (Chapter 2 *passim*). Apropos a concern with what he calls machine beauty more generally, Gelernter discerns a wide-ranging popular hostility: "[i]nsisting that beauty is at the heart of science and technology is like ordering wine at lunch, or tacking ruffles to your office furniture—it takes a serious proposition and makes it frilly and frivolous" (10). Gelernter proposes that descriptions of the Macintosh's "cuteness" backhandedly feminized the machine, diminished its estimation as a serious machine, as a computer. Add to the Macintosh's underpowered components the visible beauty and diminutive size of the machine, and the cuteness label begins to carry the whiff of product-death. It was too different from the standard. Gelernter thus describes the Mac's failings as more social than technical in nature: its "shorcomings were serious … but there was nothing subtle about its advantages. Its advantages—and this was the whole point—weren't esoteric or technical; they were obvious to anyone who had ever used a computer. And yet when the Macintosh was introduced, loads of people succeeded in being unimpressed" (83). As Campbell-Kelly and Aspray describe it, too, the Macintosh's "hardware deficiencies were easily remedied…. Far more difficult was overcoming the cultural barrier" that favored IBM-style personal computers (275). The public was not ready for another revolution, especially one that domesticated the machine a little too clearly: real computers were PCs—different from the 'computer' of earlier days in its uses and constituency, but not completely emasculated, if you will. Gerlertner quotes and early Macintosh review by John Dvorak in which the industry insider described the IBM as preferable for serious computing, "a man's computer designed by *men* for men" (40); Dvorak channels Henry Ford who also "had no use for beauty on a machine, and questioned the masculinity of people who put it there" (Gelernter 40).[45] A 1984 Infoworld review, too, asserts that "[i]n spite of its impressive capabilities, the Mac simply doesn't have the look and feel of a business computer" (qtd. in Levy, *Insanely Great* 197). As Levy summarizes it, "the testosterone issue was lost already. The previous paradigm of the computer—command-based, batch-processed, barely coherent—was deeply associated in the [computer-purchasing] community with masculinity" (197). Computing, the Macintosh converts would find out, was still seen to be about social rather than computational power. At the end of the day, "the rest of us" weren't buying into the revolution.

Conclusion

Fantastic/utopian texts, regarded from a historical distance of a generation passed, generally seem the most dated of the three modes of representation. Baldly commercial offerings like *The Wizard* are most egregious in proposing consumer gizmos as social or individual panacea in highly implausible ways, but other texts, like *The Last Starfighter* or McCorduck's *Universal Machine* seem merely willfully naïve in their proposition of salvation through technology. With their pie-in-the-sky optimism, their optimism, and their genuine wonder, fantastic/utopian texts are also among the most poignant of the personal computer revolution, often bespeaking passionate desires to reform not only the technological landscape, but the wider social world as well. *Superman III*'s reform of wizard Gus Gorman, and Apple's design of a computer "for the rest of us," for example, evince real, if unrealizable, utopian desires. Nevertheless, even a wonderfully imaginative text like *Tron* is underpinned by established, ultimately conservative, social values that belie its ostensible utopian futurism. As Bolter and Grusin suggest, remediation—the working through of one medium in another—is not a culturally neutral process. They write: "We have adopted the word [remediation] to express the way in which one medium is seen by our culture as reforming or improving upon another. This belief in reform is particularly strong" among proponents of digital media (59). For Bolter and Grusin, this ethic of media-reform is culturally consequential, and they thus assert that "[r]emediation can also imply reform in a social or political sense, and again this sense has emerged with particular clarity in the case of digital media." They note particularly the political/technological zeal of a "whole fringe of rhetorical hangers-on that has grown up around computer technology [and] is defined by its commitment to technological salvation" (61).

All of these visions are not mere technological fantasies, of course, but bring material pressures to bear on culture. After all, if fantastic texts colonise the imagination, making visible and sensible what cannot be broached about the computer, the more utopian visions explictly name the personal computer as politics *reified*. The argument for materiality is inbuilt, for example, into the early Macintosh keyboard that explicitly refused command-line interface modes by removing cursor keys to enforce mouse-use. This is not to say that the ultimate effect or ideological import of a given technological fantasy or computing utopia is (always) evident, or that it matches projection—as with the flying cars of the Gernsback-era pulp, the utopian universal personal computing machine has come to seem a little silly. As the market failures of the explicitly utopian and radically different Macintosh demonstrate, the personal computer that moved across the cultural landscape in the early 1980s was in actual fact much more *evolutionary* than *revolutionary*, predicated ultimately on its adherence to norms of personal empowerment, a free-market entrepreneurial ethic, and established codes of gender that prefers its machines instrumental and masculinely 'ugly.'

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[1] Levy, a popular journalist who began to cover the Macintosh on assignment for *Rolling Stone*, obviously has a gift for evocative titles.

[2] Building on the technophilic and proselytizing base provided by works such as these, much of the current cyberspace hoo-ha is resolutely fantastic/utopian in outlook, be it promulgated by educators, academics, the business community, or politicians.

[3] The first strand brings us Linux and the Open Source Software movement, and the other, WebTV.

[4] According to the glossary section of *Wired Style: Principles of English Usage in the Digital Age*, a killer app is defined as "a software application that breathes life into an underused technology" (Hale and Scanlon 107). The guide recognizes Visicalc as a killer app for the Apple, and the quite-similar Lotus 1-2-3 as the killer app of the PC.

[5] The 20th anniversary DVD edition of Tron offers, among its five hours of supplementary material, a considerable collection of promotional materials, including four original theatrical trailers, one trade trailer, seven poster concepts (developed but ostensibly not released) and four posters promoting the theatrical release.

[6] This quotation, and those following, are obtained from the four, numbered, trailers on the *Tron* DVD.

[7] *Blade Runner* and *Tron* were released to theatres nearly simultaneously: *Blade Runner* opened in North America on 25 June 1982, while *Tron* appeared two weeks later, on 9 July 1982 (IMDB.com).

[8] Dillinger seems a throwback to the model of the 1970s—corporate evil, with anthropomorphized malevolent computer. But Dillinger also represents the end of the hobbyist era of microcomputing. Encom, appararently, is a garage startup that grew up: hippie, sarcastic, bearded Dr. Walter Gibbs represents the old-guard. We learn he is the founder of the company, relegated to its margins by the more corporate-minded Dillinger. Responding to Gibbs' complaints about new practices at the company, Dillinger chides him: "Encom isn't the business you started in your garage anymore. We're bidding accounts in thirty different countries—new defense systems. We have one of the most sophisticated pieces of equipment in existence." As Dillinger describes it, the new economy of computing looks a lot like the computing of the 1960s and 70s, in the IBM heyday. Alan Bradley, too, is a more sober-minded programmer than Flynn, buying into the business end of the computing revolution. He laments of Flynn that his former colleague was "the best programmer Encom ever had, and he ends up playing Space Cowboy in some back room."

[9] William Palmer's *The Films of the Eighties* devotes a chapter to what he calls "The Yuppie Film Texts" of that decade, a group of movies particularly attuned to workplace politics, upward social and economic mobility, and material acquisitiveness. While such yuppie texts as *Wall Street* and *Bright Lights, Big City* may question the validity of the yuppie work hard/play hard ethic, they nevertheless participate in articulating and disseminating these values.

[10] For more on the links between popular cinema and videogaming in the early 1980s, see my "It's the Chance of a Lifetime: Cinematic Videogaming and the Domestication of Computing," forthcoming in "From Dots to Bodies: Intersection of Cinema and Video Games," a special issue of *TEXT Technology*.

[11] Heather Zwicker, reading this section, raises the spectre of 'pinball wizards.' Certainly, early representations of the arcade videogame industry across a variety of popular discourses—journalism, advertising, production and distribution networks—drew from the well of the established coin-operated amusements. This debt is complex, and is, in part, addressed in Steven Kent's *The Ultimate History of Video Games* in "Chapter 1: The World Before Pong."

[12] At the very least, this becomes clear in retrospect, as the next scene shows us these robots in action. The first real scene of the film opens with another tight closeup, on a red flower, swaying in the breeze. It is squashed flat by a tank, which is then itself completely demolished, along with several personnel trucks and a couple of jeeps, by laser-shooting robots peering red-eyed and malevolent from within sand-bag bunkers. The whole sequence borrows heavily from James Cameron's *Terminator*, released two years earlier—the flower-crushing, and the design of the robots, the ceaseless and effective killing, the extensive battlefield upon which humanity is laid waste by machines. All of this activity takes place in the first six minutes of the film. The filmmaking is deliberately disorienting; the only emotional cue in the first scene is offered by the crushed flower. Does that make the tank the enemy? Did it thus 'deserve' to be blasted to smithereens by an apparently omnipotent set of robots? As

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viewers we do not have a lot of context to work with, moving from the tight closeups of the title sequence, into the tight closeup of the flower-crushing, into closeups (portions of) robots and military vehicles; in this, *Short Circuit* again demonstrates a critical/dystopian trope. Mid-shots show us at most the entirety of a vehicle—enough for a pyrotechnic special effect to be fully seen, but giving only glimpses of what appears to be a grassy, unpopulated field of battle.

[13] A master shot or establishing shot, in the parlance of film semiotics, is is long shot showing subjects in a contextual field—it sets (establishes) the boundaries of a scene of action. Susan Hayward comments on the didactic nature of shot length: "the closer the shot, the more subject its value, the more the meaning is inscribed from within the shot; conversevly, the longer the shot the more objective its value, the greater the participation of the spectator or reader in the inscription of meaning" (319). In this case, then, the opening minutes of *Short Circuit* tightly circumscribe interpretation, deliberately restricting the field of view to promote a dystopian reading of the scene. Opening the visual field to a broader framing frees the viewer to make a broader, contextual sense of the events previously depicted.

[14] An alternate tagline for the film proposes that "Life is not a malfunction." The connotations of this tag, however, are more negative, culturally as well as grammatically, recalling legacy trops of berserk artificial intelligences.

[15] It is important that the errant robot has not hatched a full-fledged escape plan, that it 'comes to life' by a freakish accident, only slowly comes to consciousness (first evidenced in fascination with a butterfly), and manifests 'facial expressions' of befuddlement and surprise rather than malevolence and cunning. The sentience and 'humanity' that Number Five will eventually exhibit is the result of magic rather than the logical result of hubristic engineering feats, as was the case in, for example *Colossus: The Forbin Project*. In that film, the computer gains sentience and asserts agency because it functions too well, not because it has suffered a fate-delivered electrical blessing. Number Five is at once too guileless and too passive to be seen to possess dangerous agency: like a child separated from its parents, Number Five is helpless outside the NOVA compound.

[16] The 'military' is embodied by NOVA security head Skroeder (played by G. W. Bailey, apparently reprising his role as *Police Academy*'s cartoonish Lt. Thaddeus). Skroeder speaks with the bottled-upness of a constipation-induced goosestepper; there is nothing at all likable—or threatening—about this security head, eager to blow things up, but just as eager to attain control of the search and to speak in military jargon. (He has an interesting interchange with top bureaucrat Howard on the topic of whether helicopters are more appropriately referred to as 'choppers' or 'hueys' in the military jargon *du jour*.) Skroeder shows a remarkable lack of imagination, as well as an outright hatred for the robot, calling it and its ilk "garbage cans with guns, newfangled bullshit."

[17] There is a whole lot of verbal backup going on, and some strangely emotive screen shots of Number Five's 'malfunctions' which seem as much typographical as logical: his confusion is manifested in a screen displays that vary in size, shape, and placement, a graphical display far from the order of the command-line interface we would expect from such a military setting.

[18] After watching so much television, he begins to speak in (popular) tongues—he is John Wayne collapsing the big bully Frank, he is the jokester reprogramming three SAINTs to behave like the Three Stooges. The very first input he manages to return to Crosby is the perfect replication of a Dr. Pepper billboard: he asks "Wouldn't you like to be a Pepper too?" Number Five is also more culturally aware than just about everyone except Stephanie; he is, for example, able to discern that the night is beautiful when Crosby remains clueless. He is also better at giving compliments: coming across Stephanie in the bath, he names her attractive, notes that she is a different colour, and determines that she has 'nice software.' He is a great dancer, stealing moves from director Badham's earlier *Saturday Night Fever* (1977), and swaying Stephanie around the living to the strains of "More than a Woman." (The way that this scene is intercut with the *Saturday Night Fever* footage gives the creepy sense that Number Five is trying to seduce Stephanie. Ew! What would *Forbidden Planet*'s archetypal tin man Robby the Robot say?)

[19] In what appears to be the easiest hack of all time, Gus perpetrates his digital crime by re-programming the payroll computer after hours. The system he uses apparently understands English, as Gus types in very simple, plain-language commands to alter the payroll program to his benefit. For example, he overrides the machine's security by typing 'override.' Gus maintains the appearance of

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haplessness throughout: his 'verbal backup' is marked by a tone of problem-solving, frustration, and finally, glee.

[20] The computerized breakdown of the material, while tremendously precise, is not complete: a fraction of the mineral's components remains indeterminate. Never a stickler for details, accuracy, and certainly averse to hard work, Gus makes the executive decision to use 'tar' as the 'unknown' ingredient. This decision is motivated by the fact that he is smoking at the time that the computer returns its analysis.

[21] As with Terri Dolittle, the character Gus Gorman is so disenfranchised, so marginal, and so free of world-conquering intent that he is not, in the final instance, threatening. This despite his virtuoso natural computing ability, his criminal pursuits, and his easy control of important computing infrastructures. Again, the selection of an outsider comic for this portrayal is canny: although brash and aggressive in their dealings with machines and their workplace superiors, Pryor and Goldberg both speak from positions of alterity with respect to corporate or computing power. They are iconoclasts with limited scope of operation. Further, in screen time not devoted to computing, both Terri Dolittle and Gus Gorman engage in farcical behaviour intended to allow us to laugh at their expense: Terri unconvincingly dressed as a Supreme, looking like a man in drag, getting hassled by diplomats, her dress accidentally caught in a machine; Gus squealing his way through his interactions with the employment insurance clerk, his constant haplessness and incomprehension in the face of Webster's big plans, his crazy impersonations of 'white folk.'

[22] Watch the ad on the Internet at: http://www.uriah.com/apple-qt/1984.html .

[23] Twitchell indicates the power of the ad's legibility as complex filmic text: he notes that most people do not remember that there is a 'Big Brother' voice narrating in English throughout the ad, let alone the substance of what the figurehead is saying (187). The soundtrack of beeps, rustlings, rumblings, and droning voices are of a piece, working in tandem with the visual arrangement of the ad, as a whole signifying unit.

[24] Text provided at http://www.uriah.com/apple-qut/1984.html.

[25] Indeed, the predecessor most vividly recalled by this depiction is of the scrawny, hysterical teacher in Pink Floyd's animated video for "The Wall." An apt citation for this ad.

[26] A high-D and a D, according to Stein.

[27] See the ad at: http://jupiterii.tripod.com/gallery/MiscAds2/jefferson.JPG

[28] See the ad at: http://jupiterii.tripod.com/gallery/MiscAds/franklin.jpg

[29] Expandable thumbnails, one per page, at: http://jupiterii.tripod.com/index.html

[30] This parallel construction assumes that the addressee of the ad knows enough about this later 'revolution' to discourse on it intelligently. It's an assumption the ad apparently cannot make, as it moves on to explain to readers exactly "How Apple's versatility helps you declare your independence." Later still, readers are advised about "Where to get personal advice about personal computers." The revolution is invoked in the ad—then it is created perforce.

[31] The association of computing technologies and practices to American revolutionary politics and ideals lingers: John Perry Barlow's "Declaration of the Independence of Cyberspace" (1996) is probably the best known example of this genre.

[32] Here's a phallic computer indeed. And where's Eve? Wasn't she the original Apple owner? See the ad at: http://jupiterii.tripod.com/gallery/MiscAds/AdamAd.JPG

[33] Another index of market confusion is the fact that Apple's very first ads ran, of all places, in *Playboy*: Jobs was aiming at a different audience than a *BYTE* ad would reach. Such a tactic had never been tried; no market research supported or discouraged such a tactic (Freiberger and Swaine 276). According to McKenna, "It was done to get national attention … and to popularize the idea of low-cost computers" (276). Note the emphasis on the idea of personal computing, affordable by an individual: in addition to pushing its own product, Apple had to create a market, create consumer desire.

[34] This linkage between Kubrick and Clarke's imagined computer and the 'real world' is exacerbated by an early-noted word-play in the naming of the malevolent HAL 9000: increment each of the letters in the acronym and you get 'IBM.' Kubrick and Clarke always insisted that this was purely accidental, but the 'coincidence' remains a vital part of the lore about the film.

[35] The Mothership Apple fan site reproduces several early Macintosh print advertisements, including the original 20 page glossy insert that appeared in Newsweek in early 1984. Access these ads at:

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http://jupiterii.tripod.com/ and link to the "Advertising & Brochure Gallery." Most of the ads described below can be seen on page 3 of the archive.

[36] Manufactured by Sony, the disks held 400kb of data—slightly less than a third of what the now-standard floppy disk can hold

[37] Apparently, or apocryphally, one of the reasons this original Macintosh did not have a hard drive was the requirement such a device presented for internal cooling—it is the cooling fan to which we owe much of the humming, buzzing, and outright noise generated by most computers. Steve Jobs is reported to have been concerned for the aural footprint left by the machine, again (depending on your point of view) demonstrating the holistic view or hubristic missteps of the design team.

[38] Users did, though, have to reach around to the back of the machine to plug the mouse in—later versions of the Macintosh devised uniform cable-connectors for the keyboard and the mouse. The keyboard plugged into the rear of the main unit, and the mouse, refreshingly, plugged into the keyboard, easing cord clutter, and adding to the mouse's range of motion.

[39] I don't want to hear it about the Xerox Star and the Alto! These were machines that never sold at all (Alto) or sold in the dozens only to disappear into the byzantine corridors of government (Star). And I don't want to hear it about the Lisa: Lisa cost $10,000 and was a market flop. I am more willing to hear demurrals on the basis of the only quasi-accessible sticker price of $2,495 (US) for the Macintosh. Even some team members at Apple thought the price too high—Steve Jobs, notably—but more profit-margin-considering heads prevailed—John Sculley and the board of directors, probably to the machine's market disadvantage (Levy, *Insanely Great* 180). Still, at a quarter of the price of Lisa, the Mac clearly aims for a popular demographic, even if it doesn't quite reach it.

[40] It's not clear which machine Apple is comparing the Mac to. Some possibilities: the Osborne 1, the first portable, featured in the movie Brainstorm, weighed 24.5 pounds; the Kaypro II weighed 26 pounds; the Compaq portable was a hefty 28 pounds; IBM's Portable PC tipped the scales at 30 pounds (all measures from http://www.oldcomputers.net).

[41] Later versions of the Mac relented and added cursor keys and a numeric keypad to a redesigned keyboard. Still, the Mac has the worst cursor key layout of any computer I have ever used, probably a lingering testament to the mouse-centric emphasis of the OS. The original keyboard is nicely illustrated in the *Byte* review (Williams, "Macintosh" 43).

[42] Jef Raskin originally assembled the Mac team—he was later ousted by Jobs, who saw the product through to release. The Macintosh bears many traces of Raskin's initial ideas, but as it was Jobs who became the driving force behind the final product, we will look more closely at him.

[43] To get a sense of the design standards the Mac rebelled against, check out the entries for 1984 at Old-Computers.com: http://www.old-computers.com/museum/year.asp?st=1&y=1984

[44] Unusually, the design team is pictured in the ad. Team members look scruffy and casual: they are arranged in a haphazard line, in jeans, slouching, leaning on one another, crossing their arms. Some are bearded; most have longish hair. One is a woman! Someone holds the main unit. Someone else holds the keyboard. The Macintosh's carrying case rests in the centre of the picture. These people do not resemble the priesthood so readily called to mind when computing was invoked in conversation a decade previously. These people are hackers, "excited by a common goal." The ad text narrates the achievements of a group of utopia-minded revolutionaries—Apple's corporate presence is minimized: it is the engineers who introduce the Mac, not Apple.

[45] Along with this quotation from Dvorak, Gelernter offers a veritable litany of industry reviews and assessments of the Macintosh that employ subtly gendered language to minimizing effect, with the word 'cute' predominating as damnation-via-faint-praise. My own research into the Macintosh has revealed similar and continuing assessments: *Byte* reviewer Williams uses words like "pleasing" and "elegant" to describe the machine, and even contemporary historians like Ceruzzi, Frieberger and Swaine, and Campbell-Kelly and Aspray find their prose marked by similar coinages.

Part III: The Universal Machine

Part III: The Universal Machine

The three apparently contradictory and conflicting modes of representation that articulated and triangulated the new material metaphor of the personal computer—integrationist, critical/dystopian, and fantastic/utopian—all operate from a common base: in each mode of representation, the taken-for-granted is that the computer *must* be represented, that it must somehow be slotted into the daily lives of people who *will* use them. And so Ted Nelson portends sweeping change in his 1977 call-to-keyboards, *The Home Computer Revolution*:

> The United States—indeed, the world—is about to be totally changed by a revolution few people have seen coming. The corporate world is unprepared for it. The public is unprepared for it. Governments are unprepared for it. And it will remake our world as drastically as the automobile, the telephone, or the atomic bomb. It is the home computer revolution. (Nelson, *HCR* 10)

This is the ideological coherence: the computer *will* be universally adopted, *will* be an inevitable mark on the cultural landscape. Formally, we are meant to infer that all the old rules of engagment—ethical, political, historical—no longer apply in the brave new world of personal computing. However, as the survey of each of the three modes of representation has shown, this abandonment of established structures of power and order is largely rhetorical: each, finally, continues to promote and ethic of individualism, a politics of laissez-faire market capitalism undergirded by technological one-upmanship, and a vision of the world largely determined by a history of American revolutionary rhetoric and faith in technology. The personal computer is a continuation of capital by other means, however much it tries to construe itself as a radical change in social operation. This 'radical change' is expressed in a pervasive rhetoric of revolution that suffused discourses of personal computing over the 1980s.

The revolutionary position is the one which most handily allows technology to function as the *deus ex machina* of our imperfect culture, and rehabilitated the machine's reputation. For make no mistake: the spread of computers through mid-twentieth century Western culture alarmed people. Remembering his technophobic youth in the 1960s, Levy writes "What I and my equally smug friends felt we did know was this: computers were evil" (*Insanely Great* 11). A 1976 survey of Americans undertaken by Time and the American Federation of Information Processing Societies (AFIPS), like the "Machine of the Year" poll of 1983, surveyed the attitudes of the lay public on this question. The sponsors suggest that "[i]ncreasing utilization of computer technology is producing a 'Quiet Revolution' on the American scene" and that cultural attitudes are "frequently speculated about but [are] far from understood" (AFIPS/*Time*). Under the general heading of 'Computers and Life,' the responses are summarized thus: "The general effect of computer usage as perceived by the individual drew a divided response" (AFIPS/*Time*). 91% of respondents believed "computers are affecting the lives of all of us"; three quarters responded optimistically to this statement. Nevertheless, more than half thought humanity was too dependent on computers, and that computers were dehumanizing. A full third saw computers decreasing human freedom. 12% believed computers capable of independent thought, and twice that number worried computers might disobey human programmers. Obviously, these numbers indicate that survey respondents, at least, held contradictory and emotion-laden views of computing.

These emotion-laden views were not so easily dispatched by visions of magical "cycles made of light" in *Tron*, or of IBM's computer-using Little Tramp plunking away at the new and diminutive machine. The advent of the calendrical 1984, especially, renewed fears for an Orwellian future. *BYTE*'s new year's edition in 1984, entitled "Future Trends," highlights the symbolism-rich date in a cover illustration by Robert Tinney. The cover depicts a generic personal computer, an all-in-one box with green monochrome screen. The display is taken up by the number '1984' which appears to have 'slid down' from the top of the screen. Where the keyboard should be placed we see instead numerous high-tech implements: a reel-to-reel tape recorder, a hi-fi stereo setup, the space-shuttle, a tank, a digital wrist-watch, a microwave, a camera, a washing machine, a lamp, a digital coffee-maker, a sports car, a pocket calculator, and a factory assembler-robot. The space bar is replaced by an electronic music keyboard. Where the function keys would be placed, we see an older-style computer terminal, a television, a typerwriter, and a console telephone. I list these depicted technologies to indicate the range of influence of the idea of computerization in 1984. Some technologies are radically new, the stuff formerly of science fiction: space shuttles, robot workers, fancy computer terminals. Some are ridiculously altered versions of machines already well-known: does computerization do much besides befuddle the users of telephones, coffee pots, and stereos? In early 1984, 'the computer' had split apart into untold numbers of 'personal computers'; now personal computers threatened to split up and infest all of lived daily culture in ways seen and unseen. Big Brother, surely, is watching.

The narrative construction of the "home computer revolution" as a panegyric to computerization run amok depends on a separation of new computing technologies from existing ones, a denial of filiation with established discourses of computing that has the interesting effect of normalizing both machines in an either/or formulation reminiscent of Baudrillard's poll. This is a a solution that sees computing machines paradoxically diffused ever more broadly across culture. It sells a lot of computers, and resolves the ambivalence noted in the 1976 survey, mainly by preying on Western tendencies to strong individualism and gadget-itis. The personal computer would, it was claimed by Ted Nelson and others, transform computing and computers from the dread practices and terrifying objects depicted in the 1970s into a new tool that would combat the excesses of the prior machine. Even Lyotard finds himself prey to the glamour of this false solution. Acknowledging both the material and the ideological effects of new computing technologies on the emerging postmodern condition, Lyotard demonstrates that "along with the hegemony of computers comes a certain logic" (4). And while he admits in *The Postmodern Condition*'s final paragraph that the computer "could become the 'dream' instrument for controlling and regulating" the postmodern condition, he also believes that it could aid in countering this trend, by making greater amounts of information more widely available. He offers universal access as a tonic that is "in principle, quite simple: give the public free access to the memory and data banks" (67). Such is the purport of the home computer revolution: if big computers are the problem, little computers are the answer.

In some ways, this is revolution by conscription: "You can and must understand computers NOW," the cover of Ted Nelson's 1974 *Computer Lib/Dream Machines* exclaims. *The Home Computer Revolution*, takes up the gauntlet again, invoking all-caps again to proclaim, "WE MUST ALL LEARN COMPUTER EASE." In 1981's *The Making of the Micro*, Christopher Evans scolds: "[t]he greatest bulwark against the slide into an electronic 'Dark Age' is an informed public opinion. An educated citizenry learns to exploit new technology. An ignorant one becomes its victim" (9). These texts concern themselves with the ways these more 'ordinary' subjects adapt—or ought to adapt—themselves to computing machines, repeating the interpellative call of the ads, an iron fist in a velvet glove. If the computer oppresses you, it's your own fault. Certainly, an aura of compulsion clings to the revolutionary rhetoric of the time. Nelson's *cri de coeur* and Evans's sharp warning operate on the register of fear—if you don't get computers, computers will get you. By and large, though, and notwithstanding the critical/dystopian mode of representation, the home computer revolution proceeded by persuasion. Consumers were seduced by glossy advertisements making grand promises, were eager to 'get in on the ground floor' of a cultural shift likely to reward the haves as it left the have-nots behind, oddly attracted to survivalist modes and harsh me-first tech aesthetics. We have seen this in the preceding chapters. I'd like to end, though, by examining another rhetorical strand of the home computer revolution, one which conflates the home computer revolution quite explicitly with the advance of late capital, in ways that seem to run counter to all of the other modes. At base, the home computer revolution is an economic tale, an entrepreneurial success story, a market bubble. Despite themselves, utopians like Ted Nelson can't help but pitch the revolution in market terms; *Time*, too, in its "Machine of the Year" profile, normalizes the personal computer by reference to accepted narratives of sales and profits.

The Home Computer Revolution

A sociologist and philosopher by training and inclination whose technical credentials are self-deprecatingly referred to as "mostly self-taught," Nelson is attuned to the cultural aspects of computing practices. In 1975 he self-published *Computer Lib/Dream Machines,* whose ethic is largely captured in its doubled title.[1] *Computer Lib* is subtitled "You can and must understand computers NOW" and the cover illustrated by a stylized raised fist in the manner of other liberation movements.[2] In the opening pages, Nelson outlines his desire to offer "a chant you can take to the streets: COMPUTER POWER TO THE PEOPLE!" (*CL* 2). Computer power is to be brought to the people by careful explanation, and, importantly, demystification—de-*myth*ification—of the machine. This myth is underpinned by rumour and imaginative representation. Nelson continues: "Symbolic of this is of course Charlie Chaplin, dodging the relentless, repetitive, monotonous, implacable, dehumanizing gears of a machine he must deal with in the film *Modern Times*" (*CL* 9). In *Computer Lib*, Nelson takes aim at what he calls the "Myth of the Machine." This myth, according to Nelson, understands that "there is something called the Machine, which is Taking Over the World … [T]he Machine is a relentless, peremptory, repetitive, variable, monotonous, inexorable, implacable, ruthless, inhuman, dehumanizing, impersonal juggernaut, brainlessly carrying out repetitive (and often violent) actions" (*CL* 9). He repeats this idea a fair bit, as it is the key obstacle to widespread individual computing. Nelson devotes the entire four-paragraph "Summary of this Book" that opens *Computer Lib* to the myth that angers him so: the summary begins, "Man has created the myth of 'the computer' in his own image, or one of them: cold, immaculate, sterile, 'scientific,' oppressive" (*CL* 1). Note the scare-quoting of 'scientific,' a typographical tic indicating Nelson's strong skepticism of metanarratives of objectivity of all sorts.[3] Nelson is a great fan of selective capitalization and scare-quoting to mark off the mythic; the accumulation of adjectives, a practice he repeats throughout his work, also speaks to the excessive signification and the difficult definition of the mythic machine he seeks to deflate.

The computer field is rife with flim-flammery and obfuscation and Nelson notes that "[i]t's awfully easy to fool people with simple words, let alone buffalo them with weird technical-sounding gab" (*CL* 8). Thus he sets out to debunk, at various points, "The Damned Lie," "Horrible Misunderstandings," "Those Funny Numbers on Your Checks," and "Computer Putdowns" designed to make new users feel stupid, lumping these all into the category of 'cybercrud,' the remedy for which is simply knowledge. Nelson's cry of "Down with Cybercrud!" (*CL* 2) provokes a two-pronged agenda: first, empower Joe Turkey User on a wide scale by demystifying the machine, its uses, and its powers; and second, reform the computer industry itself, which has, according to Nelson, grown far too comfortable making things easy for themselves and hard for users. In *Computer Lib/Dream Machines*, Nelson tries to alter the reputation and the use of minicomputers and mainframes.[4] But by 1977, with the publication of *The Home Computer Revolution*, Nelson felt the time had come for the revolution to begin in earnest. This revolution is to be built from the personal computing practices promoted in *Computer Lib/Dream Machines*, but also, importantly, embodied in new, smaller, home use machines distinguished from the machines written about in the earlier work. Nelson writes, "[h]ome and personal uses of computers will dwarf the ordinary computer industry" (*HCR* 11). The home computer revolution proposes computing power for the people, through a doctrine of individual use, the construction of new subjectivities for the information age, and the trumpeting of increased personal agency in an ever-more technologized culture. While his earlier book(s) sought to liberate existing computers from dehumanizing use, and to dream new creative uses for them, *The Home Computer Revolution* pins this project to a new, rapidly spreading, increasingly inexpensive machine, a *home* computer, a *personal* computer. This machine, unlike the computers Nelson lists at the end of *Computer Lib* for the use of interested rich people, corporations, and institutions, is a consumer durable, ranging in price from $400 to $3000, accessible to most individual purchasers (*HCR* 102-3).

Nelson frames this revolution for an inexpert target audience by invoking a rhetoric of magic: the opening flyleaf of the book offers a a science fiction fable dissolved into a contemporary reality:

> Suppose someone had invented a magical robot which could do automatic typewriting, memorize any information that you wanted it to, and juggled that information later .... Let's say this instrument is called a Retupmoc ... Would you like one? Believe it or not, you can

> have one now. But it's not called a Retupmoc. It's spelled the other way around: C-O-M-P-U-T-E-R. (*HCR* prelims.)

The magic here and elsewhere largely inheres in the personal empowerment the 'Retupmoc' or computer offers to the individual user. Later, Nelson notes that "[t]he point of your own general machine is controlling all the others, or having it do your own thing, in your own personal way" (*HCR* 29). Or, to put it another way, "To each his, or her, own" (*HCR* 29). The attractiveness of the revolution to potential conscripts is partly attributable to gizmo-itis, as well, part of a long tradition of American technophilia that sees the widespread adoption of telephones, cars, cameras, radios, televisions, as popular consumer products. Nelson notes that "[w]e 20th century folk—Americans especially, perhaps, but all us coevals—are gadget-hungry. The inventions we have listed [I've recounted them just above] caught on because they involved, in varying degrees, privilege, style, leadership, power, freedom, convenience, and leisure entertainment" (*HCR* 16). And so the home computer.

Along with the motivation of privilege, style, *et cetera*, comes the caution against being the last to join the party: "For each dramatically successful consumer product, the number of people who knew it would catch on were always in the minority" (*HCR* 16). Whereas in his earlier works Nelson had sought to induce a love of computing in the general public simply by listing all the wonderful and exciting things the machine could be made to do, and by debunking the myth of its inutility to non-experts, in *The Home Computer Revolution* he adds a whiff of unstoppability, of inevitability, of compulsion to the more positive sell. People laughed at the telephone—"[a]nd computers, as everyone knows, are big and hard to use" (*HCR* 16). There is a kind of market imperative to computer use and ownership narrated in *The Home Computer Revolution*: "In a couple of years it will be no more unusual to own a computer than to own an automobile. The home computer offers limitless possibilities and no prospect of market saturation" (HCR 11). The revolution is a confounding of personal empowerment and market dominance: Nelson writes, "[t]he little computer, costing from five hundred to five thousand dollars, will be the most explosive consumer product in human history, selling more units in less time, and having a more revolutionary effect, than any other object ever sold" (*HCR* 15). In this passage, it is unclear what 'revolutionary effect' the author intends to reference—sales figures? Similarly the 'explosive' nature of the consumer product—explosive in the sense of blasting up the computer marketplace, or in the sense of empowering the consumer/user? The slippage between two separate causes and the effects attributable to either of them indicates a troubling conflation of market success and personal empowerment.[5] As much as Nelson finds fault with popular historians and journalists who propose the radical newness of the personal computer, thus creating his long hoped-for revolution out of spurious narrative while advancing a flawed technological determinist argument, he nevertheless cannot propose a similar narrative reason for the failure of personal computing in the age of the mainframe and minicomputer. Outlining DEC's corporate history, Nelson suggests that that innovative company's development was hindered by "the lack of suitable marketing and suitable conceptual understanding. The potential customers had no idea of the possibilities, and the small computer companies, and their salesman, had no idea either" (*HCR* 44). Suitable conceptual understanding—that is, a sense that the computer can be used by individuals for 'personal' purposes—is linked specifically to marketing, to what we can understand as corporate narrative, a market utopia.

"Machine of the Year: The Computer Moves In"

To propose utopia is to sell more copies to a population in the main more in tune with the *idea* of personal computing than with the *practice*. *Time*'s "Machine of the Year" article on the personal computer, then, opens with a reasonable question pulled from a booth at a trade show—"WILL SOMEONE PLEASE TELL ME, the bright red advertisement asks in mock irritation, WHAT A PERSONAL COMPUTER CAN DO?"—before skipping into a dizzying recitation of the machine's scope and power. More exuberantly than even Ted Nelson, the article then outlines the personal computer's truly staggering market success and its exponential growth in sales before moving to the punchline: "The 'information revolution' that futurists have long predicted has arrived, bringing with it the promise of dramatic changes in the way people live and work, perhaps even in the way they think.

America will never be the same" (Friedrich). A gripping idea, surely, but not a statement that answers the opening question. In any case, the revolution described is one that now moves purposefully towards utopia, not its reverse—the article also references *Time*-sponsored polling data that indicate that "[a]lthough [Americans] see dangers of unemployment and dehumanization, solid majorities feel that the computer revolution will ultimately raise production and therefore living standards (67%), and that it will improve the quality of their children's education (68%)" (Friedrich). Notice that Americans are 'feeling' and 'seeing danger'—the poll asks for their sense of the computer, their conjectures about its import, and their beliefs about its effects. It does not ask them about their experience of the computer. Steven Levy recalls the atmosphere of 1982, calling the *Time* cover story the "latest domino to fall in an avalanche of indicators that computers were the hottest thing going. No one was sure yet what the theme of the eighties would be, but it was clear that the Thing of the Eighties would be the personal computer" (*Insanely Great* 14-15).

The feature's substantial length allows for the coverage of many disparate topics: the personal computing industry, individual uses of personal computers, the automation of the office, the potential and actual applications of networking and remote databases, videogaming, the 'japanese' threat, computer crime. Overall, this breadth rather adds to the sense of the personal computer as awe-inspring technology necessarily to be reckoned with than undermines the sense that computing is overwhelming. Moving from industry specs and utopian speculations, the article details four different computer users in turn—and one of their wives. One California-based Apple user is a vice-president of a multinational corporation. He uses his computer—almost certainly running *Visicalc*—to model different financial scenarios. Another Californian, a stockbroker in his mid-40s, uses the computer first to telecommute and second to start his own firm. The third profilee, a factory safety director in North Carolina, has devised custom software to track workplace injuries. He has also written programs for his family members: a word-processor for his wife, and a math tutorial for his son. The next computer user is a former professional football player and current office furniture salesman living in Minnesota. Aaron Brown claims to have been turned onto personal computing by his teenage son, who convinced him the machine was more than a toy. He now writes his own profit profiling programs. Brown and his family are shown climbing the rungs of computing prowess: Brown amasses a large and expensive collection of software, and son Sean writes his own programs. Brown's wife and daughter, initially resistant to the purchase of the computer—the former cast her vote for a new carpet and the latter wanted a California vacation—have come to appreciate and use the family Apple. Personal computing is implicitly construed here as a male or youth endeavour. The computing subjects depicted are nearly all male, a practice continued in the section outlining home computer networking and Internet use. The women are mothers and wives, users of technology provided by husbands and fathers.

The utopia laid out for the personal-computerized future has, in addition to a strong entrepreneurial and testosterone-heavy technoproduct pedigree that plays so well with American audiences, a touch of the fantastical, the science-fictional about it. The "Machine of the Year" piece invokes the jargon-laden argot that underpins computing culture, in a demonstration of the fetishized cybercrud that so outrages Ted Nelson. The one thousand computer companies at the Las Vegas industry convention reported by the article display their "floppy discs and disc drives, joy sticks and modems," from the "HP9000" to the "Votan", the "Olivetti M20" to "The Alien Group." If readers still doubt the revolutionary nature of the new machine and its incursions into workplaces, schools, and homes (in decreasing order of penetration), the article goads us:

> It is easy enough to look at the world around us and conclude that the computer has not changed things all that drastically. But one can conclude from similar observations that the earth is flat, and that the sun circles it every 24 hours. Although everything seems much the same from one day to the next, changes under the surface of life's routines are actually occurring at almost unimaginable speed. (Friedrich)

Readers are reminded that electrification and the internal combustion engine are technologies only one hundred years old—and look at the effects they've had. If you don't see the revolution, it's because you're behind the times. By choosing the personal computer as “Machine of the Year” where it had been accustomed to selecting a human agent, *Time* elevates the machine to the status of agent, heroizes it, focuses the public debate about computerization in the home, school, and workplace, around this particular object rather than a set of social practices, or even human social agents. In the end, this is perhaps the most fantastical element of all.

The article’s author seems to be aware of the tendency to hyperbole, cautioning that ads and prognostications are visited by “elements of exaggeration and wishful thinking” (Friedrich). The feature does address the flaws of available computing options, as well as the public fears about a dehumanized workplace and a technologized private life. Noting that home computing is a voluntary activity, “the same machine can seem menacing when it appears in an office,” the article speaks to a growing anxiety about the sweeping changes that computing threatened to bring to white collar work. A general undercurrent of feeling that understands computing power as economic power is destabilized by the fear that computers will render them obsolete. The article details the workplace revolts of both secretaries and executives: the one group fear their jobs might be entirely mechanized, and the other that their skills will no longer be held in esteem The technology is made to seem to possess an agency of its own, which is hindered by petty fears. A quoted industry source thus suggests that “[t]he biggest problem in in introducing computing into an office is management itself” (qtd in Friedrich) This problem is based on personal fear of obsolescence, worry about rivals: it is based, that is, on small-scale personal concerns, and not on the long view. The long view, of course, favours computerization.

The *Time* article is careful to distinguish the personal computer from its forebears, highlighting the distinction by scare-quoting its first reference to machines other than the microcomputers it honours: “To be sure, the big, complex, costly ‘mainframe’ computer has been playing an increasingly important role in practically everyone’s life for the past quarter-century” (Friedrich). It is a different kind of machine, though, working for “governments and corporations,” doing large-scale tasks like forecasting the weather (“prediction” in the article), assessing and tracking taxes, performing payroll operations, guiding missiles, and undergirding space exploration. It has done nothing less than "changed the way wars are fought," in fact (Friedrich). This machine, held "behind the closed doors of a special, climate-controlled room" does its work "invisibly," or rather, beyond the ken of the average middle class Joe and Josephine that comprise *Time*'s mass market target demographic. There is a similarly crucial, if again not terribly intuitive, distinction made between corporations and workplaces: this works both to distinguish the "mainframe" from the "machine of the year" and the purchasers and users of each from each other. Corporations use mainframes to calculate payroll, but it is the personal computer that "by the millions, … is beeping its way into offices, schools, and homes" (Friedrich). These spaces are firmly the arena of individual activity, of small-scale computing, of family life. The linkage of offices-schools-homes in a personal computing troika makes clearer the distinction of the office computer from the corporate computer. In the narrative construction of the article, the latter is linked to missiled command and weather prediction, the latter to book reports and recipe tracking. The personal computer is the Model T Ford for the digital age: a mass market technology offering greater power (of whatever sort) to individual citizen/consumers.

Like the mainframe, though, the personal computer described by *Time* holds to itself a bit of the magic of the mind-boggling scale: rather than changing the way wars are fought, a realm of activity properly the province of bureaucrats and technocrats, the personal computer is an industrial force. Its success is an entrepreneurial, market-based one, a narrative Americans can truly understand. The revolution is in consumer products, in sales in the consumer marketplace. The paragraph on mainframe computing follows directly from the intial evocation of the "awesome" and growing sales figures of the new machine. The market performance of the personal computer is offered in a recitation of mind-boggling numbers: 724,000 computers sold by 24 or so companies for $1.8 billion in 1980; projections for 1982 indicate sales of 2.8 million machines by more than 100 companies for $4.9 billion (Friedrich). Such big numbers indicate big business, and it is difficult to scale this information down to something useful or even understandable for the individual consumer. But the personal computer is not supposed to be mind-boggling, at least not in such a way as would alienate a potential small-time consumer. Rather, the invocation of market success is meant to reassure consumers that money spent on a computer is well-allocated, part of the process of instilling in Americans the "giddy passion for the personal computer" that the article is at pains to diagnose (Friedrich).

Conclusion

Through the 1980s, the personal computer of the 'real world' and the personal computer of fiction converge. Thematically, arguments are all waged at the level of surface details — will we narrate the personal computer as another consumer appliance? As a survivalist tool with which to carve a place to savvy individuals in a dystopian cultural landscape? As a magical, wondrous technology that will in and of itself save us from our own history? Each mode of representation, then, participates in the battle for rhetorical dominance among competing sense-making glosses, asking how we are to understand the ideological character of 'the computer,' and hypothesizing the cultural ramifications of each view. In all cases, though, computing becomes personalized; the technologies are smaller; they are pervasive. Nevertheless, the decade witnesses a real change in the narrative characterization of computing technologies—whereas legacy-era representations pitted the whole of human culture and unproblematized nature against the perceived threat of an advancing technoculture, personal-computer-era texts pit one kind of computing against another. The advance of technoculture is complete. And so, whereas as a film like 1973's *Westworld* pits a Wild-West outfitted hapless tourist with a six-shooter against a killer robot run amok, in a hubristic cybernetic bubble of a theme park run by a small band of white-coated engineers, in the classic, 'real man v. inhuman machines' formulation, the evil computer in *Tron* is defeated by a human protagonist who uses his virtuosic programming skills from within the computer itself after he has been digitised and inserted into the machine. All of a sudden, it seemed, the ambivalence between machine-made ease and the freedom to be unhappy that had characterized earlier representations of computing appeared to resolve itself in a flight from the lived historical moment into either pleasurable cynicism or projective utopian revolution—or both, as in the Apple Macintosh '1984' ad.

Literary and popular culture wrote the personal computer as something totally new and fundamentally opposed to the computing technologies that had preceded it. They evince a triumphalist tone: finally, they seem to say, the personal computer is here — we can only hope it will be everywhere soon. Now everything will be all right. In this way, both subscribe to a certain vision of ***technological inevitability***, a second key concept for this project. This inevitability, as we have seen, can cause alarm, apathy, or celebration—but it is never in and of itself questioned. In the journalistic accounts and imaginative representations I have outlined, the greater cultural penetration of sophisticated computing machines is cause for celebration, or relief. Corollary to this view is the idea that any discomfort attending the computerization of society results from the inflexibility or immaturity of the uncomfortable. In that the machine is the culmination of a long-term narrative structured around technological advance, its estranging effects come to seem the result of the estrangee's incapacity to get up to speed, an incapacity to get caught up in the sweep of nothing less than cultural destiny. Allied to its universality, then, is the idea of the *inevitability* of the computer. The computer is a yardstick against which culture comes to be measured: it is a marker of progressive thinking to which human beings successfully or unsuccessfully adapt themselves, to their advantage or detriment, respectively.

Self-congratulatory analyses that justify certain fictional narratives as worthy because they describe technologies, scenarios, or selves that have subsequently come into being are based on tautological and misleading forms of thinking. Remember Donna Haraway's assertion that science functions as a highly figurative discourse, dependent on the construction of plausible narratives for the establishment of its paradigms. Similarly, representations of imagined computing machines set the scene for their materialization into physical machines by carving a place for them in the common imaginary of ideology. It is thus tautological to note that some more compelling narrativizations of the computerized future seem to 'come true.' We've *made them 'true'* on the basis of this very compellingness. At base, this mode of analysis presupposes that the 'now' we are currently experiencing was/is inevitable; revisiting antecedent visions of this 'now,' we as a culture are encouraged to look for the seeds of a 'true' vision. I take another view, and propose another mode of criticism: the 'now' we are currently experiencing is the spoils of a discursive battle; let's look back and see how the lines were drawn, and the skirmishes fought. To do this, we must constantly trouble the definition of 'computer' to avoid positing a standard and essential machine whose inevitable cultural dominance colours our readings of other visions. In what can thus turn out to be complicated grammatical constructions, I am trying to foreground the very slipperiness of the idea of 'computer' and to mark this idea as fragile, contested, and implicated in ideology and power. This fragility of concept or definition is a characteristic not only of those forward-looking narratives that attempt to construct new human futures, but is also the central tension in those historical narratives that trace the 'scientific' and material coming of age of the machines we currently call to mind on hearing 'computer.'

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[1] Each half of the volume is separately paginated. Following Nelson's labelling practice, these volumes will appear as '*CL*' and '*DM*' in the citations, for *Computer Lib* and *Dream Machines* respectively. The book has two front covers, and two purposes. The self-described 'flip side' of the volume, *Dream Machines*, is subtitled "New Freedoms Through Computer Screens—a Minority Report" and features an illustration depicting a long-haired man in sandals and frayed flares floating or flying through the air toward a glowing computer screen, his finger outstretched to touch it. This is hardly the prevailing image of computing in the mid-1970s, as we have seen. The title of the volume appears in a 'thought bubble' issuing from this screen. The man is wearing a cape with a Superman-style 'S' on it. This half of the book is devoted to imagining the creative and liberating uses to which computers can be put, and to carefully outlining technical methods, machine specifications. In keeping with Nelson's stated aim of demythifying computing, this more technically advanced part of the book is nevertheless peppered with witty sloganeering and punning to maintain the iconoclastic irreverent tone: "If computers are the wave of the future, displays are the surfboards" (*DM* 35) speaks to the primacy of visual display of information; "Hardening of the Artistries" (*DM* 59) puns on the harsh angles of polygon-based computer imaging.

[2] Betraying Nelson's whimsy and hackerish tendencies to punning, another cover illustration near the spine of the book offers a silhouette of a foot, with the caption "Something is afoot."

[3] This is a populist project, and Nelson explicitly outlines his wish to be readable: "I have tried to make this book like a photography magazine—breezy, forceful and as vivid as possible" (*CL* 2). Again, "I have written this like a letter to a nephew, chatty and personal … it throws at you some rudiments in a merry setting" (*CL* 2). Across the twin texts, Nelson also engages in unusual typesetting and page design, hand-drawn illustration and titles, and a mix of layouts to offer a diverse visual field to the reader.

[4] The machines are the same—that is to say, there is no radical or paradigm-shifting technological leap, but rather a series of step-wise progressions and innovations within the field itself—but the people should be different. His many examples of innovative and interesting computing work draw almost entirely from major research initiatives at university and private-sector labs. The innovators he profiles work in the industry or in the academy; no matter how hippie or how hackerish, these innovators are nevertheless expert users with strong institutional affiliations, which necessarily place them in a different use category from the layperson Nelson targets here.

[5] On the other hand, Nelson sees more clearly than most that the distinction between 'computer' and 'home computer' is arbitrary from a technical point of view, but extremely important from a perceptual point of view. This distinction, largely based on advertising for the Apple II (a machine for which Nelson declares great fondness in the revised introduction to later editions of *Computer Lib/Dream Machines*, where he writes that "the best way for a beginner to learn about computers … is definitely to buy and [sic] Apple computer … and learn the use of it" [*CL* 1]) seems to frustrate Nelson a good deal. Having, by his own account, trumpeted the personal use of computers since the 1960s, Nelson appears irked that the tide of usage is turning not on the basis of rational persuasion, but the spurious invocation of the new and the different by popular journalists and other non-experts: "unfortunately, the way you are going to be hearing about computers in the home will make it all sound like a gee-whiz kind of surprise. The writers will begin by saying how unlikely and startling it is, when it is only a strange fact of our culture that this has not happened until now" (*HCR* 13). Nelson decries the technological determinism of this depiction, whereby a startling new machine hails startling new uses; his position has always been, by contrast, that cultures of computing have prevented or punished individual use. Such prevention is as needless as it is deliberate or wrong-headed. He is clear that usage does not inhere in the technology, writing that "[w]hen asked why the sudden demand for small computers, many computer people say that it is due to the new computer on a chip, or 'microcomputer.' This is false. The computers of the late 1960s, small and rugged, could have been used" (*HCR* 15).

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